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PC Troubleshooting

SPECIAL ISSUE SPRING 2005

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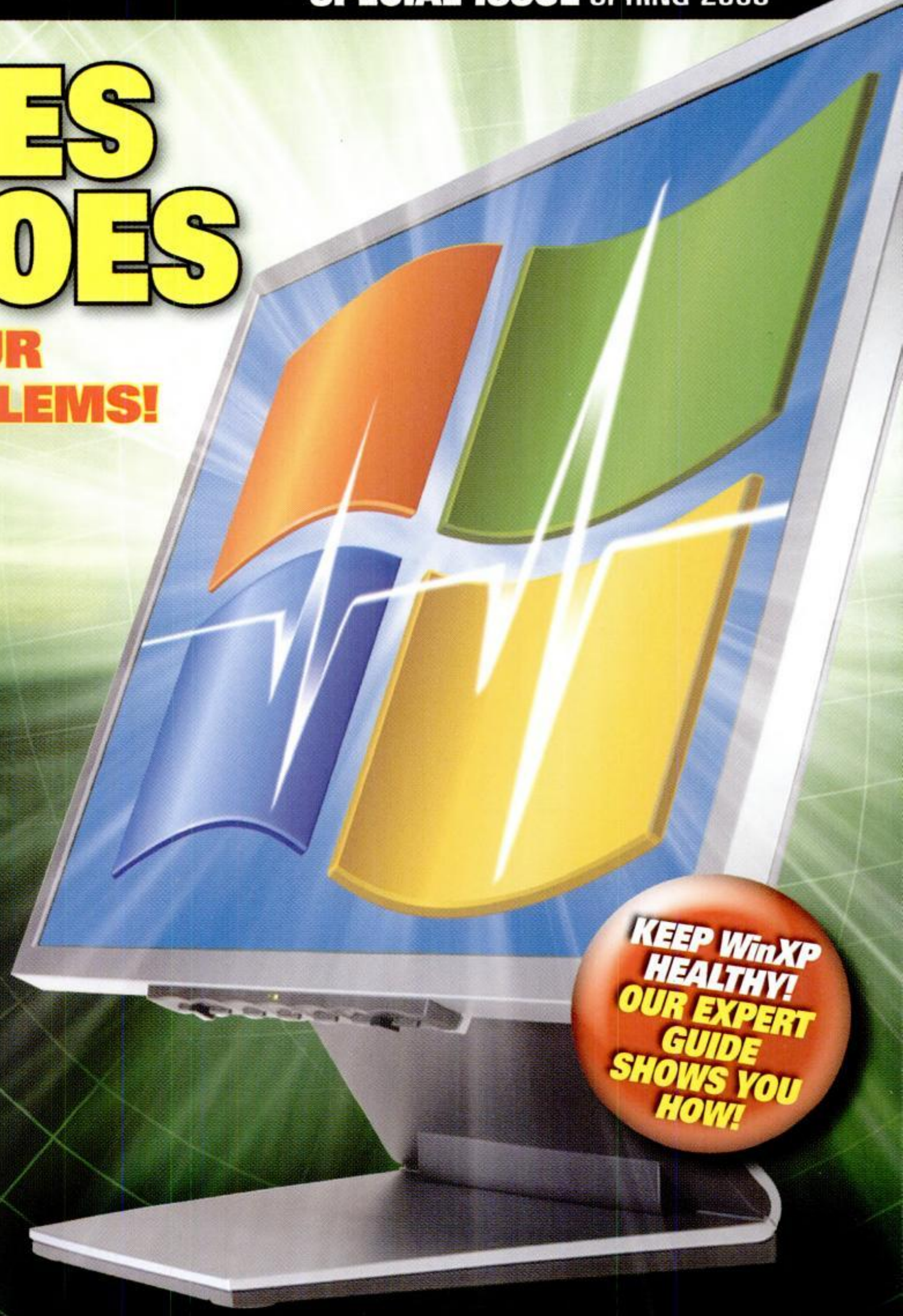

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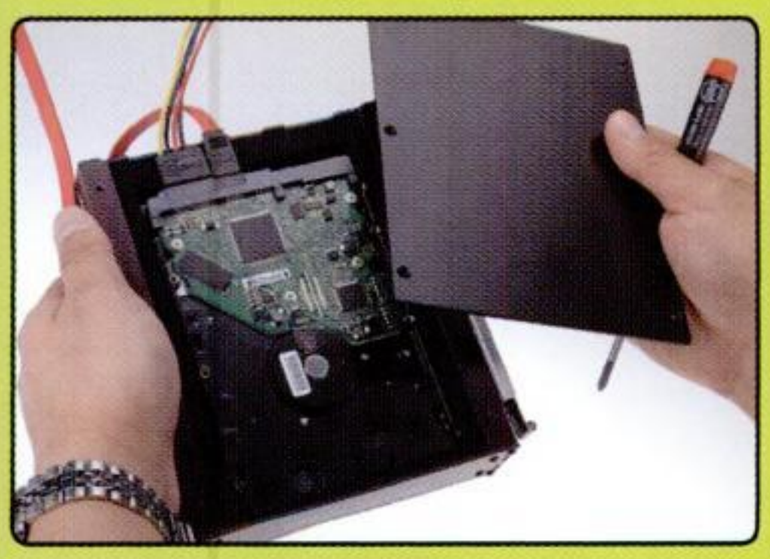

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Release Notes

R_x for Insomnia: A Healthy PC

It's 2 a.m. on a Saturday night, and you've been wide-awake ever since your significant other harangued you into abandoning your trouble-stricken PC and coming to bed. Staring up at the ceiling, deprived of sleep, you can't let it go. You can't stop your mind's eye from turning the problem over and examining it from another angle.

And then inspiration hits you like an arc of electricity emerging from a criminally defective power supply. You throw off the comforter as you bolt out of bed, tossing the cat to the floor in the process. You charge down the hall and into your office like a 10-year-old kid on Christmas morning.

"Dammit!" shouts your now-enraged bed partner. "It's just a PC. Can't it wait 'til morning?!" But you know it can't, because you just might have The Solution. So you power up your PC, pound the Delete key, and enter the BIOS setup...

If you're even half as passionate about computers as those of us at *Maximum PC*, you've no-doubt lived through this scenario; probably more than once. Even when the smallest performance anomaly surfaces, we simply can't rest until the problem is quashed. And no, it makes no difference that we don't even intend to use the machine for the next few days. It has to be fixed. Now.

The most difficult step in troubleshooting is the first one: figuring out where to begin. And that's where this magazine comes in (thanks for picking it up, by the way).

We've assembled the ultimate collection of tips, tricks, and straight-out cures for dispelling just about every PC malady known to man (and woman, too). We walk you through every step of isolating, diagnosing, and flat-out fixing your hardware-related problems. We dive deep under XP's hood to uncover its built-in troubleshooting secrets. We've even provided a collection of software tools to prepare you for most any emergency. And don't miss our celebrated Doctor's potent troubleshooting prescriptions.

So let's get started—and feel free to share your thoughts, troubleshooting tips, and anecdotes! We want to hear 'em.

—Stephen P. Klett Jr.
sklett@maximumpc.com

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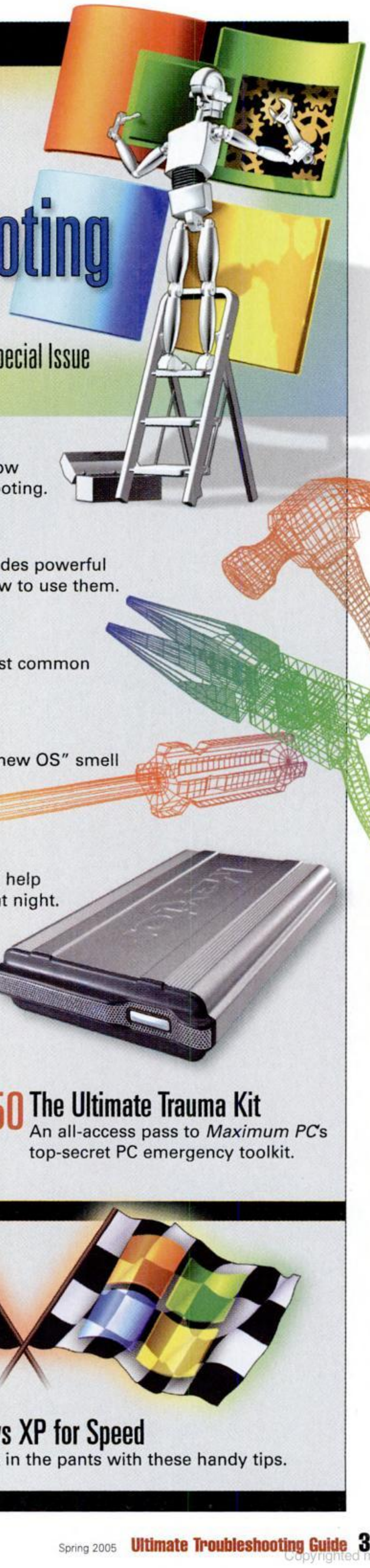
Spring 2005 Special Issue



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Ultimate Troubleshooting Guide

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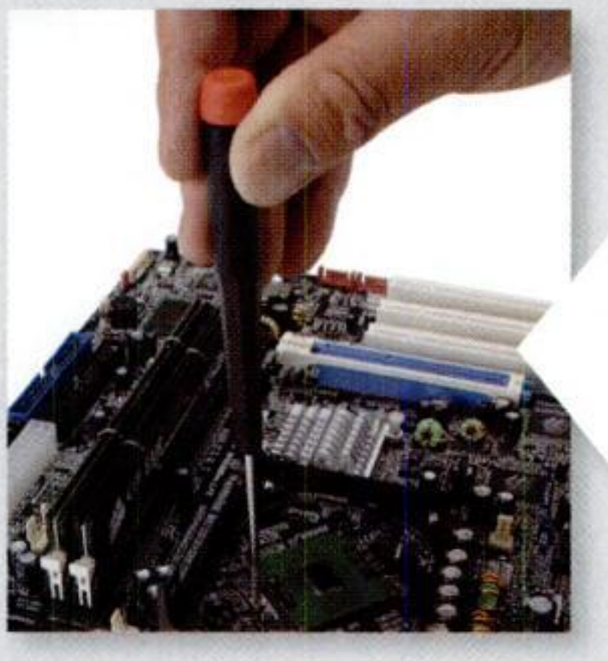

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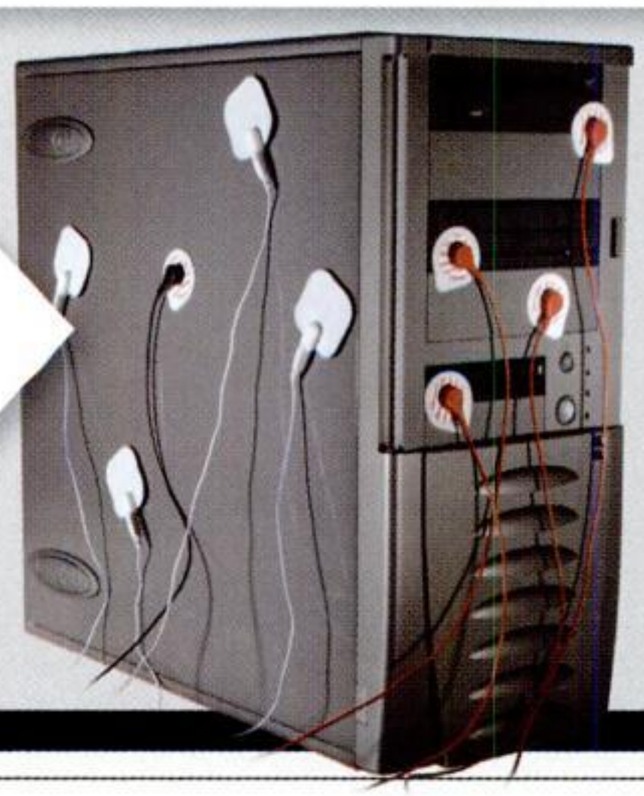

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Preview material

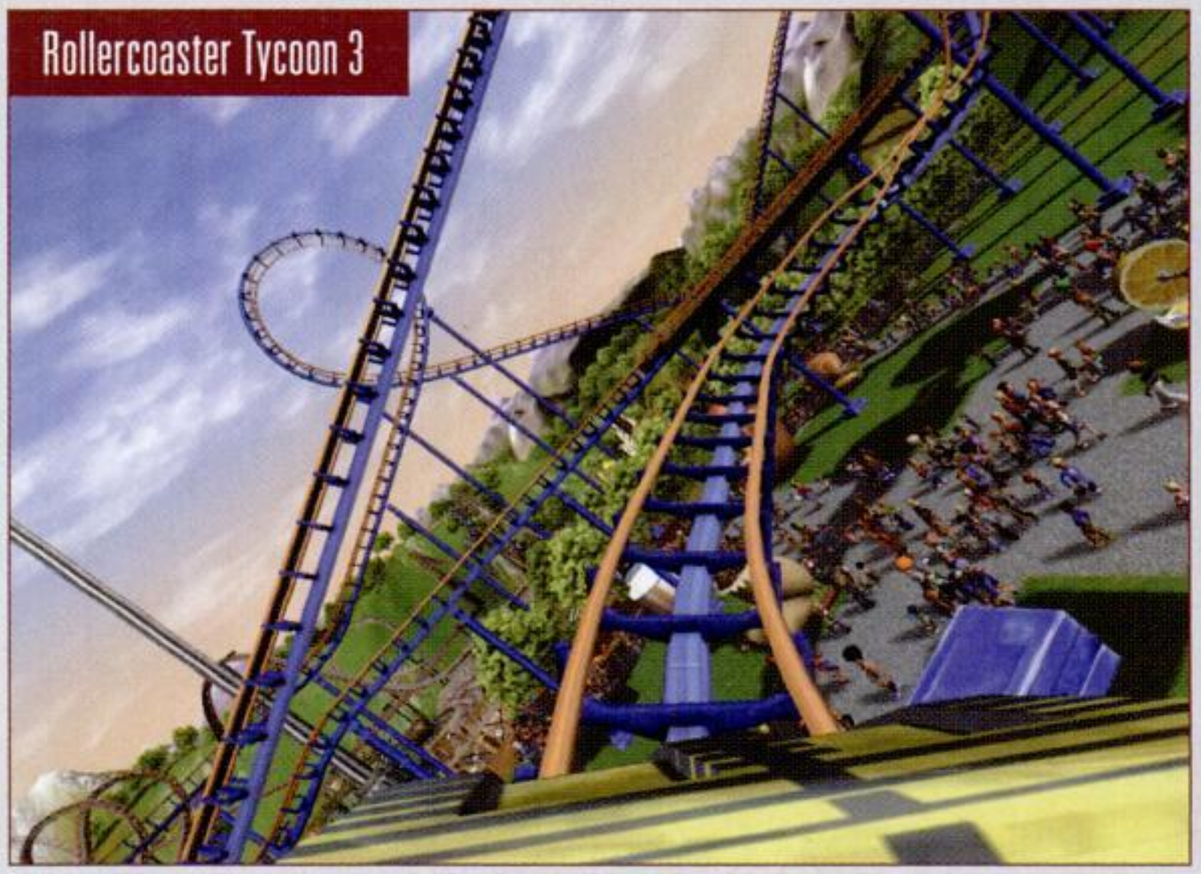
ON THE CD

9 KILLER games, 6 AWESOME apps, and 29 INCREDIBLY Useful Utilities

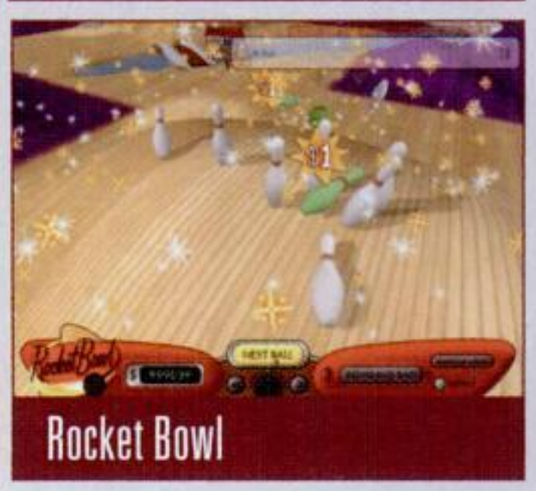
ROLLERCOASTER TYCOON 3

All troubleshooting and no play makes Jack a dull boy—and Jill a dull girl. So we've included one huge game demo on the CD to give you a bit of a breather from all this system testing and tweaking. *Rollercoaster Tycoon 3* delivers a stomach-churning, hair-raising, vertigo-inducing thrill ride—and it looks spectacular, too!

Then we've got 8 other smaller-but-addictive trial games for you to play, including *Rocket Bowl, Mah Jong Quest, Mutant Storm*—and more!


Rollercoaster Tycoon 3

Mutant Storm


Rocket Bowl

APPLICATIONS

Firefox Web Browser

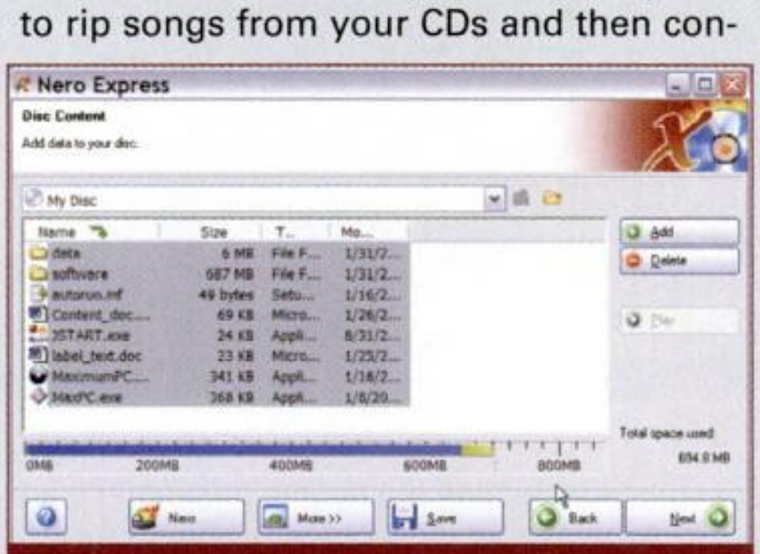
You've heard about it on the news, read about it in the mag, and now here it is right in front of you—the *Firefox* web browser. You don't have to use IE, you know. So give Firefox a try: It's safer, more robust, and easier to use.

CryptoSuite v1.07 Demo

Protect your important documents from prying eyes with this killer encryption software. Not only can you use it to encrypt files and folders, but you can also delete files securely, ensuring that they are never recovered! (You can even use it to encrypt IM sessions.)

dBpowerAMP Music Converter

This all-in-one audio ripper enables you to rip songs from your CDs and then convert them to any format. You can also use it to "normalize" the volume of audio files and record from LPs—you do know what an LP is, right? (If not, ask your Dad.)



Nero Burning ROM Ultra Demo

Firegraphic

This photo management app is one of our favorites. It makes viewing, organizing, and printing your digital images not only easy, but fun too! And it's absolutely free.

Nero Burning ROM Ultra Demo

This is the ultimate CD- and DVD-burning app. Nero lets you burn anything you want to any type of media, and it includes a utility for making custom labels. It can also be used to capture and edit video.

SmartBarXP Beta 4.9

This app puts a cool little sidebar on the side of your desktop that can be used to display an almost bewildering amount of information. For instance, you can set it up to run stock tickers, weather reports, news feeds, system resource usage, an image slideshow—the possibilities are nearly endless.

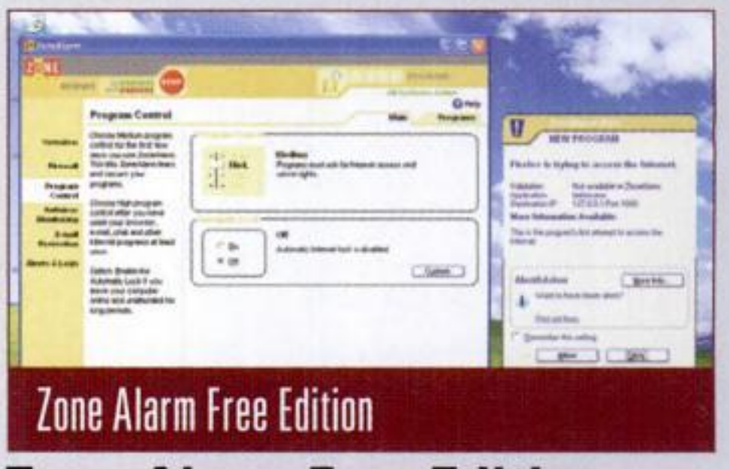
UTILITIES

Ad-Aware SE 1.05

Lay the smack down on spyware with *Ad-Aware*—the most popular spyware utility on the market. It's regularly updated to detect new threats to your PC, and regular use can go a long ways towards keeping your machine performing at maximum efficiency.

Spybot Search & Destroy

Spybot Search and Destroy is aptly named, as it roots out spyware and nukes it from your PC. It's updated fairly regularly and scans every potential hazard area in your PC, including memory, for malicious code, and it lets you safely eradicate the malware. Once you've identified threats, you can also immunize your PC from them to make sure you never get hit by the same junk twice. Nice!


Zone Alarm Free Edition

Zone Alarm Free Edition

No PC that's connected to the Internet should be without a firewall these days—and with *Zone Alarm* there's no excuse (it's free!). And, unlike most free things, this one is really good. Install it today and keep your PC safe from uninvited guests!

Exact Audio Copy

This free audio ripper is another one of our favorite utilities, and it can be used

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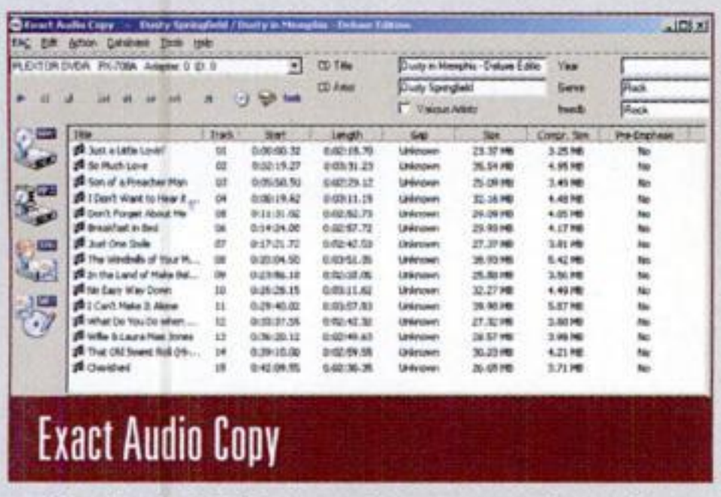


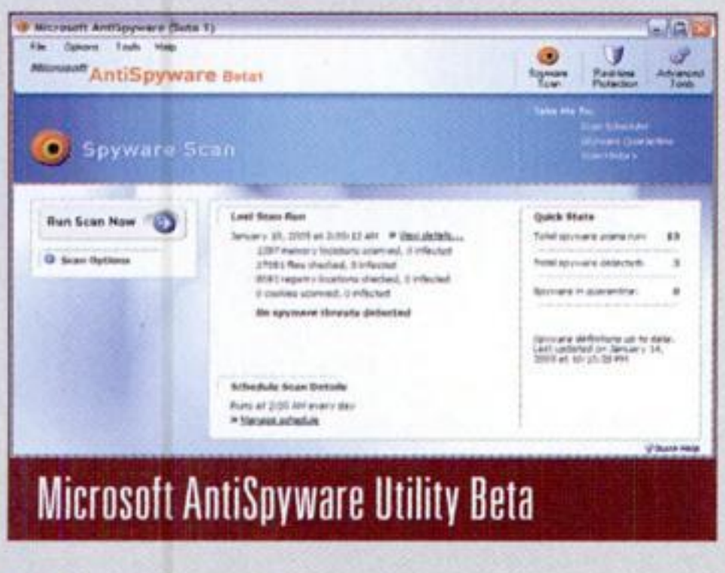
with the LAME encoder to produce flawless rips of your music.

LAME MP3 Encoder

This open-source MP3 encoder is fast and stable, and it produces excellent-quality compressed audio, especially at 192kb.

Microsoft AntiSpyware Utility Beta

Test out Bill's home-brewed anti-spyware utility. Though still a work-in-progress, it's pretty slick, and is very straightforward. Simply run it to detect and remove known spyware, and then keep it running in the system tray to prevent spyware from hijacking your PC.



Microsoft Malicious Software Removal Tool

The PC equivalent of a fire-and-forget missile, this handy utility runs once and then deletes itself, taking all the nasty code it finds with it when it goes. Check Windows Update frequently for updates.

Nokia Monitor Test

Think your display's getting a bit long in the teeth? Test its health with this quick and simple program that will walk you through every step of how to properly test your display's performance.

Space Monger

This file-management utility lets you know why you're running out of disk space (though if you use BitTorrent, you probably already know...). Just point it to any of your hard drives and it displays a graphical representation of the drive's contents, which lets you know at a glance that your Recycle bin is hogging 25 percent of your resources, for example.

MP3 Album Art Downloader

If you're an MP3 junkie, this utility is for you! This program grabs all the appropriate album art (from Amazon.com) for your collection. Note: You must view your music folders in Thumbnail view to see the art.

WinPatrol 8.12 Trial

WinPatrol uses a heuristic approach to detect attacks on your PC by nasty code. It takes a snapshot of your system resources and alerts you to unwanted modifications—hard-drive analysis is very fast.

Advanced System Optimizer Trial

This powerful little program gives you more than 30 tools to maintain, supercharge, and beautify your desktop.

System Mechanic 5 Trial

This suite of PC cleansing and protection tools includes everything you need to keep your PC running at peak efficiency.

AVG AntiVirus Free Edition

In our not-so-humble opinion, this is the best antivirus utility you can get, and it's 100% free. AVG automatically updates itself, checks for viruses (duh), and scans your email.

Intel Chipset Identification Utility

Not sure what hardware you've got? Run this utility to find out.

Cacheman XP

Use this program to optimize several system memory caches, auto-recover RAM, fine-tune a number of system settings, and give your PC a kick in the pants.

Everest Home Edition

This suite of tools performs a wide range of diagnostic, monitoring, and benchmarking duties. Use it to keep tabs on your PC's health.

Motherboard Monitor 5

This utility monitors your mobo, displaying the temperature of your case and CPU, as well as various fan speeds and more.

Memtest86

If you're experiencing system instability and suspect bad memory's to blame, this program will let you know for sure.

PE Builder v3.1.3

If you're stuck in a situation where your PC won't boot, use this program to boot into a "pre-installed environment" that will enable you to muck around with your hard drive, check your OS, look at settings, and even back up data. For more on how to use it, turn to page 67.

Webroot Spy Sweeper Trial

This is one of the most effective anti-spyware programs around. Period.

X-Setup Pro

This system-tuning utility allows you to access a plethora of "hidden" or hard-to-find system settings—more than 1,700, in fact.

WinZip 9

WinZip is the most ubiquitous file compression utility around, and no PC should be without it.

And More!

Check the disc for even more useful utilities than we had room to list here.

EXTRAS

PC Driver Toolkit

From chipset and graphics drivers to DirectX 9 and *3DMark 03*, we've compiled just about everything you could need to resuscitate or re-build a PC, and then test it to see if it's up to snuff.

DISC ISSUES?

If you should happen to have problems using the CD, here's a few things you can try:

- Open "My Computer"
- Right-click the drive that contains the Maximum PC CD
- Select "Explore"
- Double-click the pink icon labled Maxpc.exe

The disc interface should open. If this doesn't work, try updating your Flash player at www.macromedia.com. Still stuck? Got Questions or Comments?

- E-mail: Dischelp@maximumpc.com

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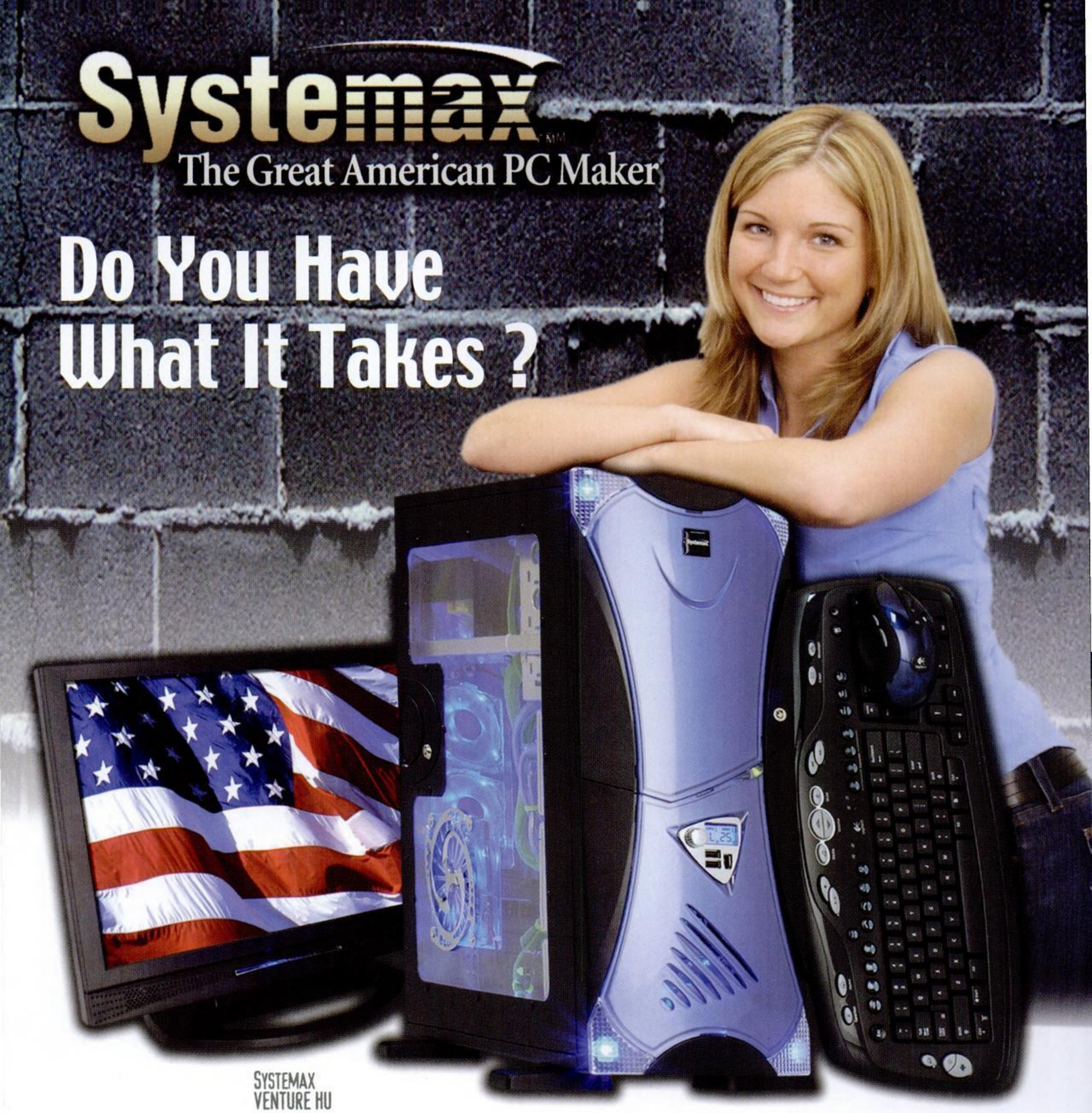
Do You Have What It Takes ?



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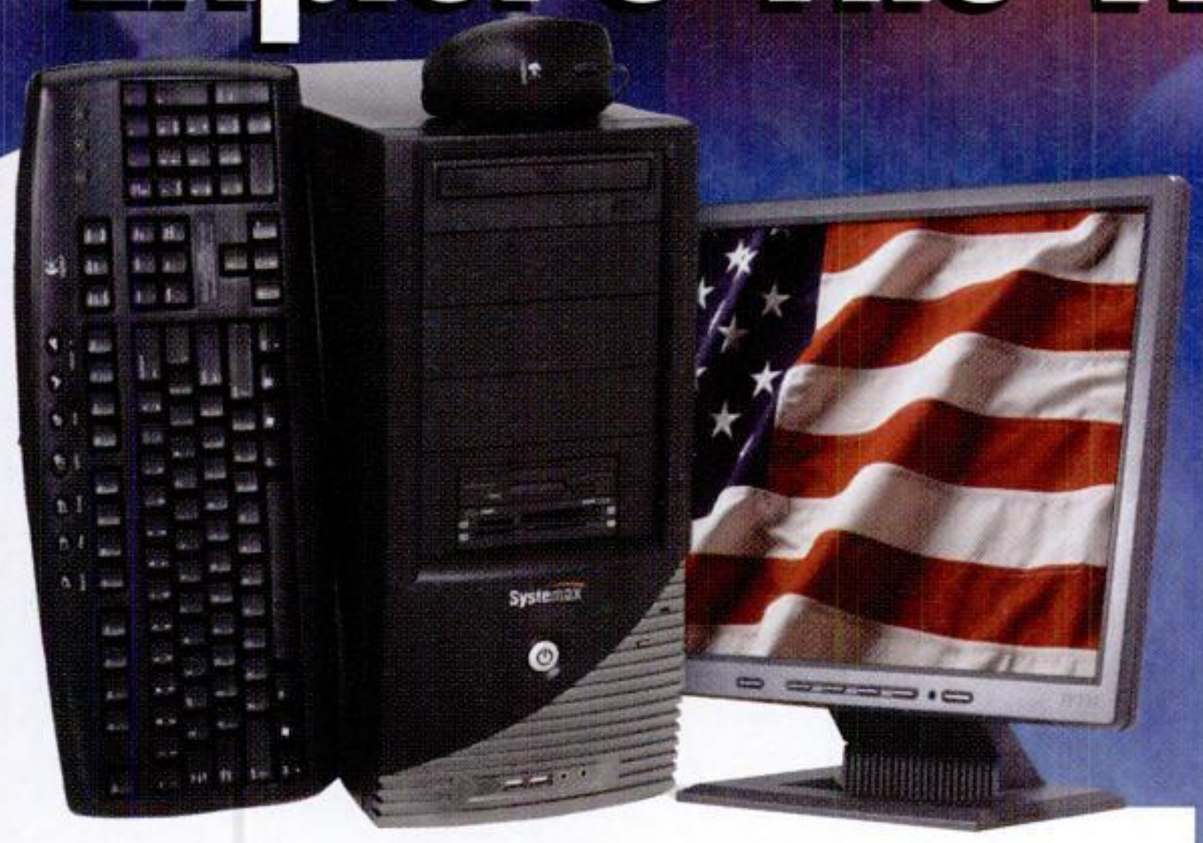

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Systemax recommends Microsoft® Windows® XP Professional

Systemax Venture HU Series

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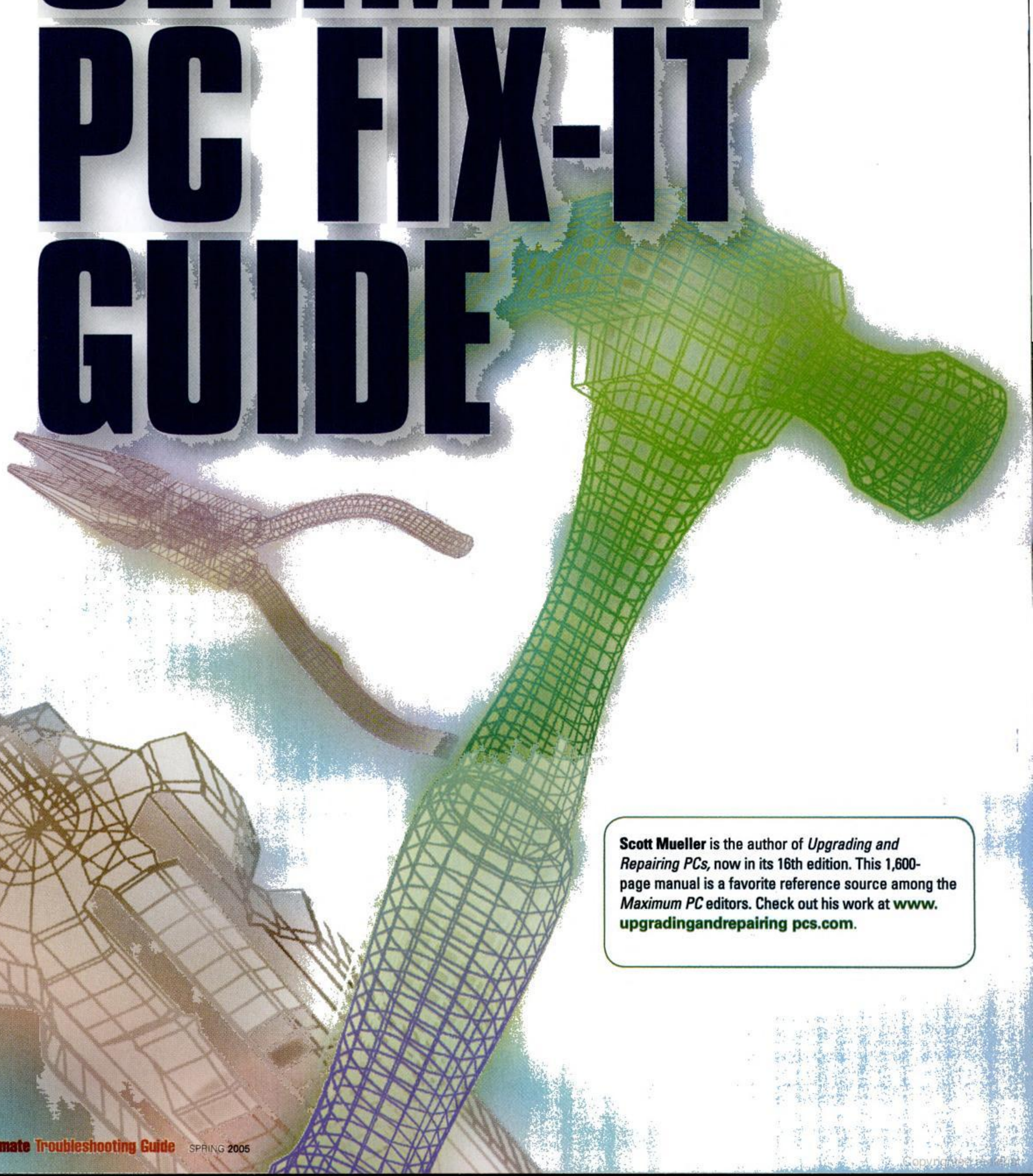
ULTIMATE PC FIX-IT GUIDE



Maximum PC's Top 20 Troubleshooting Axioms: **#1** *Your PC will break at the most inconvenient time. Accept it.*

Scott Mueller is the author of *Upgrading and Repairing PCs,* now in its 16th edition. This 1,600-page manual is a favorite reference source among the *Maximum PC* editors. Check out his work at **www.upgradingandrepairing pcs.com**.

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YOUR DEFINITIVE GUIDE TO PC TROUBLESHOOTING.

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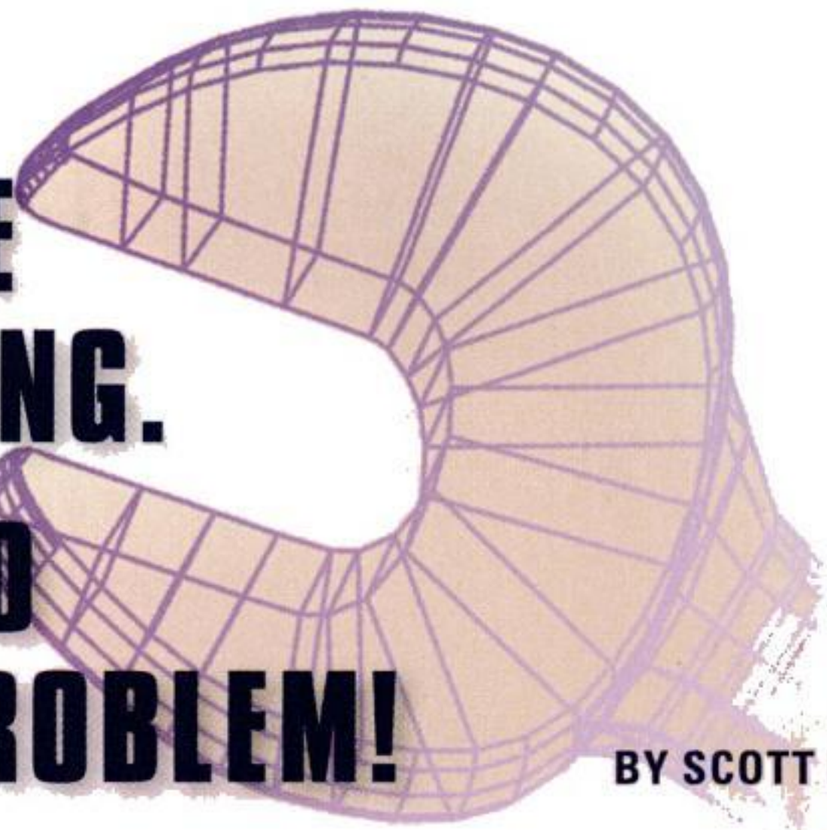

BY SCOTT MUELLER

The modern PC is an utterly incredible collection of hardware and software. Consider: There are 55 million transistors in the Intel Pentium 4, nearly 4.3 billion transistors in 512MB of RAM, and hundreds of millions of transistors in your motherboard chipset, video processor, and so on, and so on. Each of these *billions upon billions* of interconnected transistors not only has to function properly, but must also operate in an orderly fashion within strictly enforced timing windows, some of which are measured in picoseconds (trillionths of a second)!

When you realize that your PC will lock up or crash if any one of these billions of transistors fails to operate properly and on time—or if any one of the billions of circuit paths between the transistors fails in any way—it's a wonder that PCs work at all.

When I watch a system move through its startup sequence, transforming in 30 seconds from a cold, lifeless box into a fantastically capable machine that's practically alive with light, sound, and energy, I think about the billions of components that had to function properly. As you can see, there are many opportunities for problems to arise.

Luckily, modern design and manufacturing techniques have made PCs more reliable and easier to service despite their ever-increasing internal complexity. Today's systems have fewer and fewer replaceable components and individual parts, which is sort of a paradox: As PCs have become more complex, they have also become simpler and easier to service in many ways!

By understanding the basics of how PCs work, and applying some basic logical thinking and common sense, you can effectively diagnose and repair your own system. The bottom line with troubleshooting PC problems is that there's a solution for every problem. This article will focus on basic troubleshooting concepts, as well as list—and fix—the most common and troublesome PC problems.

And even if your particular problem isn't addressed in this story, you should still glean enough information about troubleshooting theory to fix your own PC yourself!

Wireframe artwork by Richard Pepper

Industry-Standard Replaceable Components

The use of industry-standard components is a key feature of all PCs—virtually all of the parts that make up a system are interchangeable with other systems in some manner. This means that the parts are plentiful, inexpensive, and generally very easy to install. If you're a regular reader of this magazine, you already know that most PCs have fewer than 20 "parts," while some may have as few as 10 or 15, depending on how many options are present and how they're integrated.

From a hardware troubleshooting perspective, one of these components will be either improperly installed, configured, or defective. If improperly installed or configured, the component can be "repaired" by merely reinstalling or reconfiguring. If defective, the component can simply be replaced. When a PC is broken down to its basic replaceable parts, you can see that it really isn't that complicated, which is why I've spent my career helping people to easily perform their own repairs and upgrades.

Reinstall or Replace?

When dealing with hardware problems, the simple truth is that we don't normally repair anything—we reinstall or replace.

I remember hearing from IBM many years ago that the company had found that 60 percent or more of the problems handled by its service technicians were due to improper installation or configuration; the hardware wasn't actually defective. This was in fact the major impetus behind the plug-and-play revolution, which has eliminated the need to manually configure jumpers and switches on most hardware devices, minimizing the expertise needed to install hardware properly. Still, plug-and-play has sometimes been called "plug-and-pray," as it occasionally requires manual intervention to get things to work. Nonetheless, many PC problems can be fixed with a reinstallment of either hardware or software; parts are rarely "repaired."

Similarly, it's often cheaper to replace a failed circuit board than to repair it. For example, you can purchase a new motherboard for around $100, but to repair an existing board would normally cost much more. Even if you could figure out which chip had failed, and had the equipment to replace it, the chips themselves are usually sold in quantities of thousands, and obsolete chips aren't normally available. The net effect of all this is that the replaceable components in your PC have become disposable technology.

Troubleshooting Tools

The tools needed for component-swapping, rebuilding, testing, and troubleshooting are basic. Start with a simple PC toolkit, which can cost anywhere from $15 to $100 or more, depending on what's included. These can be found in most any electronics or computer store. More elaborate kits can be found from high-quality suppliers like Jensen tools (**www.jensentools.com**). The simplest of these kits will normally include:

- **Hex nut drivers:** Used to remove chassis and other screws.
- **Phillips and standard flat-blade screwdrivers:** For removing screws. (Be careful with the flat-blade drivers around motherboards!)
- **T-15 Torx driver:** Many systems use Torx screws since they're superior to others for retention and grip.
- **Tweezers and/or chip puller:** For grabbing jumpers, screws, and other small parts, the chip puller is great for removing keycaps from keyboards.
- **Claw-type parts grabber:** For picking up loose screws or other parts dropped in a system.

The higher your stress level, the more likely your PC is to break down.

#2

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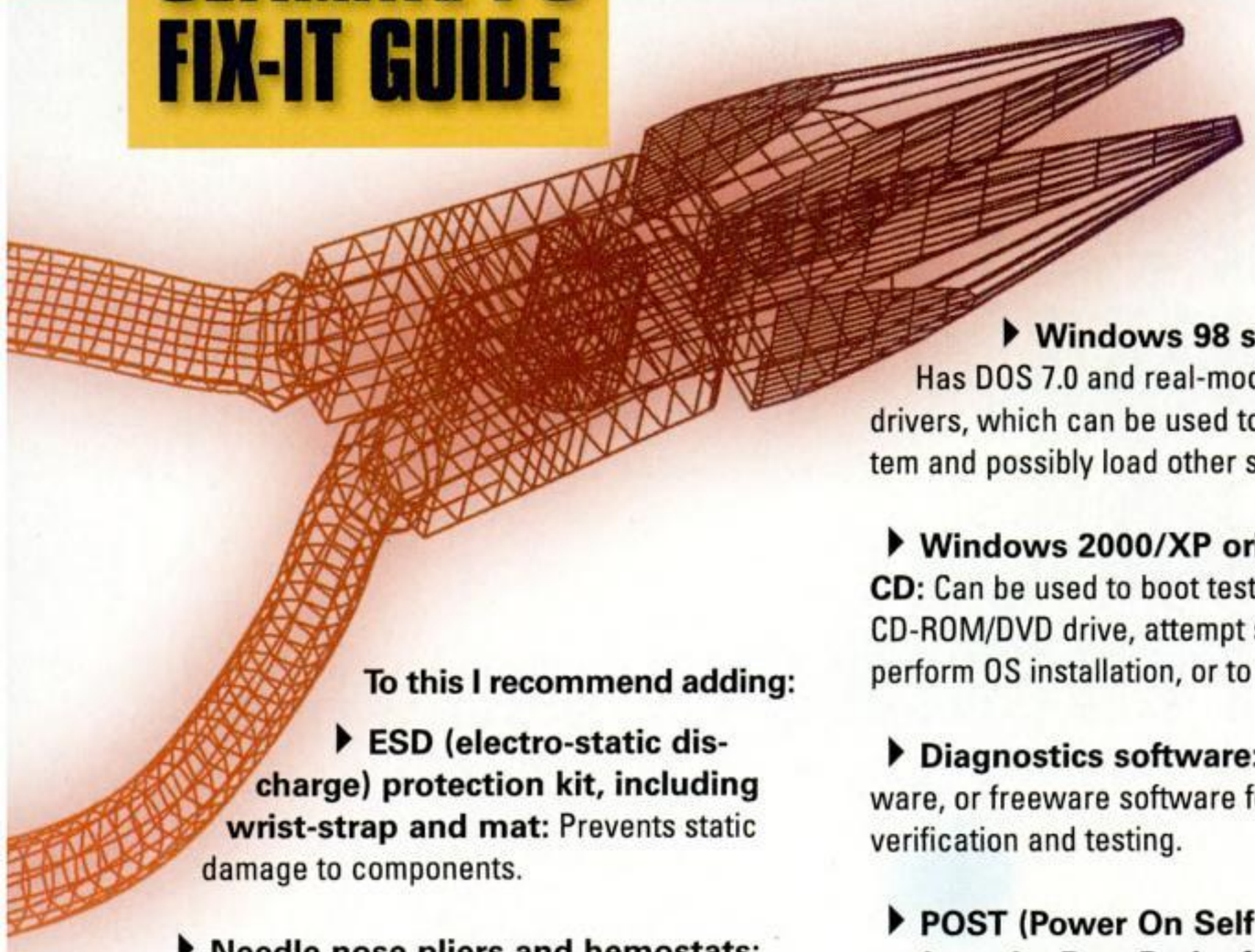

To this I recommend adding:

▶ **ESD (electro-static discharge) protection kit, including wrist-strap and mat:** Prevents static damage to components.

▶ **Needle nose pliers and hemostats:** Great for jumpers, gripping small items, straightening bent pins, etc.

▶ **Electric screwdriver (such as the Black & Decker 9073):** Combined with hex, Phillips, standard, and Torx bit sets, it really speeds up repetitive disassembly/assembly.

▶ **Flashlight:** Preferably a high-tech LED unit, which will allow you to see inside dark systems and will be easy on batteries.

▶ **Windows 98 startup floppy:** Has DOS 7.0 and real-mode CD-ROM/DVD drivers, which can be used to boot test the system and possibly load other software.

▶ **Windows 2000/XP original (bootable) CD:** Can be used to boot test the system from a CD-ROM/DVD drive, attempt system recovery, perform OS installation, or to run other software.

▶ **Diagnostics software:** Commercial, shareware, or freeware software for PC hardware verification and testing.

▶ **POST (Power On Self Test) card, such as the Post Probe from www.micro2000.com:** For displaying POST diagnostics codes on systems with fatal errors.

▶ **Nylon cable-ties:** To help in routing and securing cables (neatly routed cables help to improve airflow in the system).

▶ **Digital pocket multimeter:** For checking power-supply voltages, connectors, and cables for continuity.

▶ **Cleaning swabs, canned air, and contact cleaner chemicals:** For cleaning, lubricating, and enhancing contacts on circuit boards and cable connections.

▶ **Spare CR-2032 lithium coin cell batteries:** Used as the CMOS RAM battery in most systems. It's a good idea to have a replacement or two on hand.

Troubleshooting Techniques

There are several ways to troubleshoot a PC, but in the end it often comes down to simply reinstalling or replacing parts. That is why I normally use a very simple "known-good spare" technique that requires very little in the way of special tools or sophisticated diagnostics.

Let's say you have two identical PCs sitting side by side. One of them has a hardware problem; in this example, let's say a memory module is defective. Depending on how and where the defect lies, this could manifest itself in symptoms ranging from a completely dead system to one that boots up normally but crashes when running.

You observe that the system on the left has the problem, but the system on the right works perfectly. Otherwise, the systems are identical. The simplest technique for finding the problem would be to swap parts from one system to another, one at a time, re-testing after each swap. At the point when the DIMMs are swapped, upon powering up and testing (in this

#3 Don't panic! Step away from the keyboard. Take a deep breath—maybe two or three.

Safety

From a personal safety point of view, there really isn't that much danger in working on a PC. Even if it's open with the power on, PCs run on only 3.3, 5, and 12 volts, meaning there are no dangerous, life-threatening voltages present. But there are dangerous voltages inside the power supply and monitor. Most power supplies have 400 volts present at some points internally, while color displays have between 50,000 and 100,000 volts on the CRT! Normally I treat the power supply and monitor as components that are replaced and not repaired, and I don't recommend you open either of them unless you really know what you are doing.

Before working on a PC, you should unplug it. Do this not to protect yourself, but to protect your system. Modern ATX formfactor systems are always partially running—as long as the system is plugged in, there are standby voltages present, even if it's turned off. If you accidentally turn the system all the way on, and then plug in or remove a card, you can fry the card or the motherboard.

ESD (electro-static discharge) protection is another issue. While working on a PC, you should wear an ESD wrist strap, which is clipped to the chassis of the machine. This will ensure that you and the system remain at the same electrical potential, and will prevent static electricity from damaging the system as you touch it. Some people feel that the system should be plugged in to provide an earth ground. That's not a good idea at all. No "earth" ground is necessary; all that is important is that you and the system remain at the same electrical potential. I recommend that you use a commercially available wrist strap, rather than making your own. Commercially made wrist straps feature an internal 1 Meg ohm resistor that's designed to protect you. The resistor will ensure that you're not the best path to ground should you touch any "hot" wires.

When you remove components from the system, place them on a special conductive antistatic mat, which is also a part of any good ESD protection kit. The mat will also be connected via a wire and clip to the system chassis. Any components removed from the system should be placed on the mat. The connection between you, the mat, and the chassis will prevent any static discharges from damaging the components.

There's one thing that's true about nearly every PC in the world: It's dark in there. We've been using those wee LED lights for some time, but here's something better. The Lightwave 2000 is a flashlight with four bright LEDs that will never burn out. And hey—it's waterproof! $30, www.longlight.com.

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case "testing" is nothing more than allowing the system to boot up and run a while), you find the problem has moved from one system to the other. Knowing that the last item swapped was the DIMM, you have just identified the source of the problem!

This didn't require a $2,000 DIMM test machine or any diagnostics software. Since components such as DIMMs aren't economical to repair, replacing the defective DIMM is the obvious solution.

Simplistic, yes, but this technique is often the quickest and easiest way to identify a problem component. Instead of having an identical system standing by to borrow parts from, most technicians will have a large inventory of known-good spares. Note that these spare parts are different than new replacement parts, because when you open up a box containing a new component, you really can't be 100 percent sure it works. I've been in situations where I've had a defective component, replaced it with a defective new component, and the problem remained. This has led to a lot of wasted time checking other parts that were fine.

Another strategy is the "bootstrap approach," which is especially good for what seems to be a dead system. You take the system apart, strip it down to the bare minimum of components, and see if it works. For example, this would entail stripping a system down to the chassis/power supply, bare motherboard, CPU/heatsink, one bank of RAM, and a videocard, then powering it up to see if it works.

In this stripped configuration, you should see the POST screen or splash logo screen on the display, verifying that parts inside are functional. If a keyboard is connected, you should see the three LEDs (capslock, scrlock, numlock) flash within a few seconds after powering on. This is a sign of the POST routines testing the keyboard, indicating that the CPU and motherboard are functioning.

Once the system is functioning with a minimum of components, methodically reinstall or add new parts (for example, a modem, soundcard, or extra memory module), testing the system each time you make a change to verify it still works and that the part you added or changed wasn't the cause of a problem. Essentially you're rebuilding the system from scratch, using your existing parts, but doing it one step at a time.

Many times problems can be caused by corrosion on contacts or connectors, so often the mere act of disassembling and reassembling a PC will "magically" repair it. While it may seem that everything is installed exactly like it was before, in reality the mere act of unplugging and replugging renews all of the slot and cable connections between devices, which is often all a system needs.

Troubleshooting Tips

- Eliminate unnecessary variables or components that aren't pertinent to the problem.
- Reinstall, reconfigure, or replace only one component at a time. Test after each change you make.
- Keep a detailed record of each step you take.
- If you hit a roadblock, take a break or work on another problem. A fresh approach the next day often reveals things you overlooked.
- Don't overlook the simple or obvious; double- and triple-check the installation and configuration of each component.
- Keep in mind that power supplies are one of the most failure-prone parts in a PC, as well as one of the most overlooked components. A high-output known-good spare power supply is highly recommended.
- Cables and connectors are also a major cause of problems—keep replacements of all types on hand.

Diagnostics

If you suspect there's a problem with something at the core of your system (like the motherboard, processor, or possibly the RAM), the only way to know for sure is to reinstall or replace the item.

While you can purchase expensive memory testing machines, there really is no such thing as a motherboard or processor testing machine, at least not outside of manufacturing plants. However, there are diagnostic programs available for testing motherboards, processors, and RAM. For diagnostic software to run, the system must be healthy enough to boot from a disk, then load and run the diagnostic application. If the system is sufficiently "dead," software diagnostics will be useless.

Diagnostic software can verify what components in a mostly functional system are working properly, and are especially good for "exercising" a system to suss out any stress or heat-related problems. Most PC manufacturers perform what they call "burn-in" testing of new hardware: They run the hardware for a day or so under "more extreme than normal" use, to flush out problems that might later occur in a customer's home. Solid-state hardware failures will typically happen early if they're going to happen at all. Most PC diagnostics software can be used for burn-in testing as well.

POST Cards: Your New Best Friends

PCs can have problems that render them unable to boot, or to load and run diagnostic software. While a common response would be to replace the motherboard, processor, or RAM, a tool known as a POST (Power On Self Test) card can take advantage of the diagnostics built into almost every motherboard and help to identify problems.

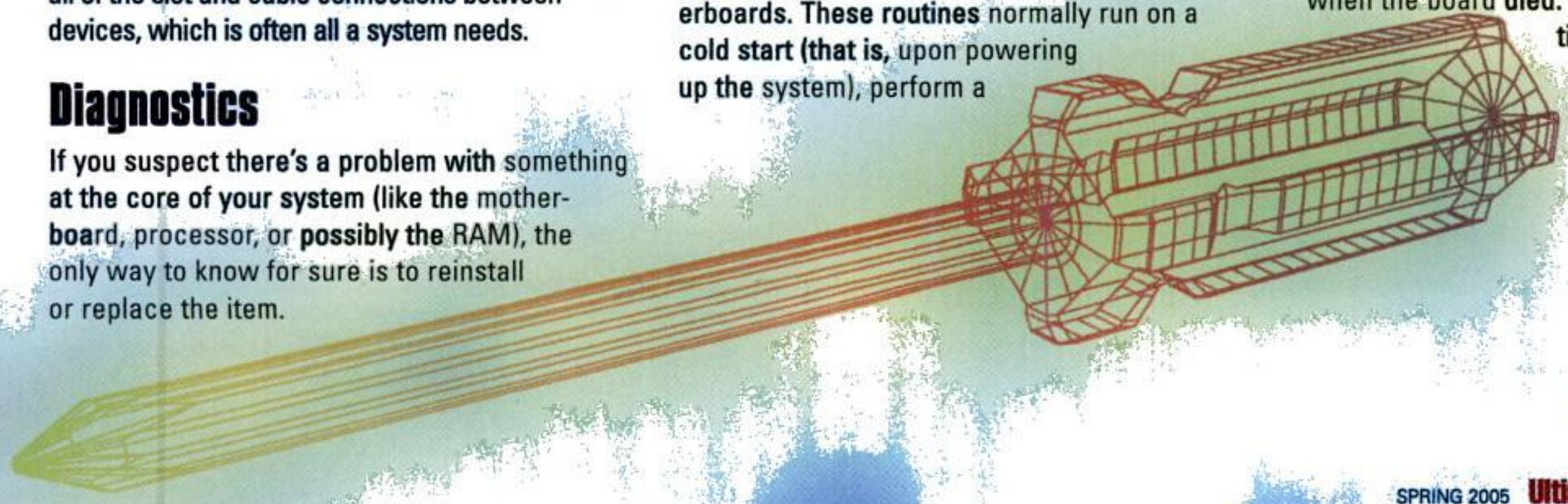
The POST is a series of diagnostic tests that are built into the ROM chip on virtually all motherboards. These routines normally run on a cold start (that is, upon powering up the system), perform a quick integrity test of the system, and possibly communicate an error if a problem is found. Much of these routines run before the videocard is initialized, and if there's a critical error in that early phase of the startup sequence, it will be impossible for the system to display an error message. These errors are normally called *fatal errors* because, for all intents, the system seems dead, with nothing on the display. Some systems will use rudimentary beep codes to communicate errors in this situation, but often there won't be a beep code for the particular problem that occurred.

What many people don't know is that the POST routines also send up to 256 different 2-digit hexadecimal checkpoint codes to I/O address 80h in the system—an address designed to be read by a POST card!

POST cards plug into a PCI or ISA bus slot, and were originally designed to be used by the motherboard manufacturer or system builders for testing bare boards. However, they have since been adopted by technicians in the field. POST cards don't contain any software or diagnostics. They only display the codes sent to port 80h by the POST. The specific checkpoint codes vary from BIOS to BIOS, and you can find them either in the documentation for the motherboard or the particular BIOS you have, or in the manual that comes with the particular POST card you're using.

The POST checkpoint codes are normally sent before each step of the test is initiated, so if the machine stops with a fatal error, you can look at the POST card to read the last checkpoint displayed. Then, by looking up that checkpoint number for your particular motherboard/BIOS, you can discover what step was running when the board died. This can often help identify which component on a board has failed.

Unfortunately, often the result is that you'll be replacing the motherboard anyway, in which case the only advantage to the POST card is that you'll know exactly why you are replacing the board!



When attempting to fix your PC, attitude is everything.

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Your Most Vexing PC Problems—Solved!

When I power up the system, I see the power LED light and hear the fans spin, but nothing else ever happens.

The fact that the LEDs illuminate and fans spin indicates that the power supply is partially working, but that doesn't exclude it from being defective. This is a classic "dead" system, which can be caused by almost any defective hardware component.

In my experiences, I've had more problems with power supplies than most other components, so I'd immediately use a multimeter to measure the outputs at the power supply connectors, and ensure they were within the proper 5 percent tolerances of their rated voltages. Even if the voltage measurements checked out, I'd swap in a high-quality, high-power, known-good spare supply, and retest. If that didn't solve the problem, I would revert to the "bootstrap approach," and strip the system down to the bare minimum of components.

If the motherboard now starts, begin adding the components one at a time, retesting after each change. If the symptoms remain, then use a POST card (if you have one) to see if the board is partially functional, and where it stops. Also try replacing the videocard, RAM, CPU, and then finally the motherboard. Finally, verify your CPU and heatsink installation.

I see a "STOP" or "STOP ERROR" in Windows NT/2000/XP.

Many different things—including corrupted files, viruses, incorrectly configured hardware, or failing hardware—can cause Windows STOP errors. The most valuable resource for handling any error message displayed by Windows is the Microsoft Knowledge Base (MSKB), an online compendium of more than 250,000 articles covering all Microsoft products.

You can visit the MSKB at **http://support.microsoft.com,** and use its search tool to retrieve information specific to your problem. For example, say you were receiving "Stop 0x0000007B" errors in Windows XP. In that case you would visit the MSKB at the address listed above, then enter the error message in the search box. I entered "stop 7B error Windows XP" in the box, and it returned two articles, one of which was titled "HOW TO: Troubleshoot 'Stop 0x0000007B' Errors in Windows XP."

The article had a complete description of the problem and solutions, and stated that the error could be caused by "boot-sector viruses, device driver issues, hardware issues, and other issues." The article proceeded to explain each issue and solution in detail. All things considered, the MSKB is a valuable resource when dealing with any problems related to, or reported by, any version of Windows or any other Microsoft software.

I see "Fatal Exception" errors in Windows 95/98/ME.

This is the equivalent of the STOP error in Windows NT/2000/XP. As indicated in the previous answer, this can be caused by both hardware and/or software problems, and the best place to check for specific solutions is in the Microsoft Knowledge Base (MSKB).

The system won't shut down in Windows.

This is another example where the MSKB comes to the rescue. By searching for "shutdown problems Windows XP," for example, you will quickly find several articles that will help you troubleshoot this type of problem. This problem can be caused by bugs in motherboard ROM (try upgrading your motherboard ROM to the latest version); bugs in the various Windows versions (visit **www.windowsupdate.com** and install the latest fixes, patches, and service packs); or, in some cases, configuration or hardware problems. I'll defer to the MSKB articles for more complete explanations of the Windows issues.

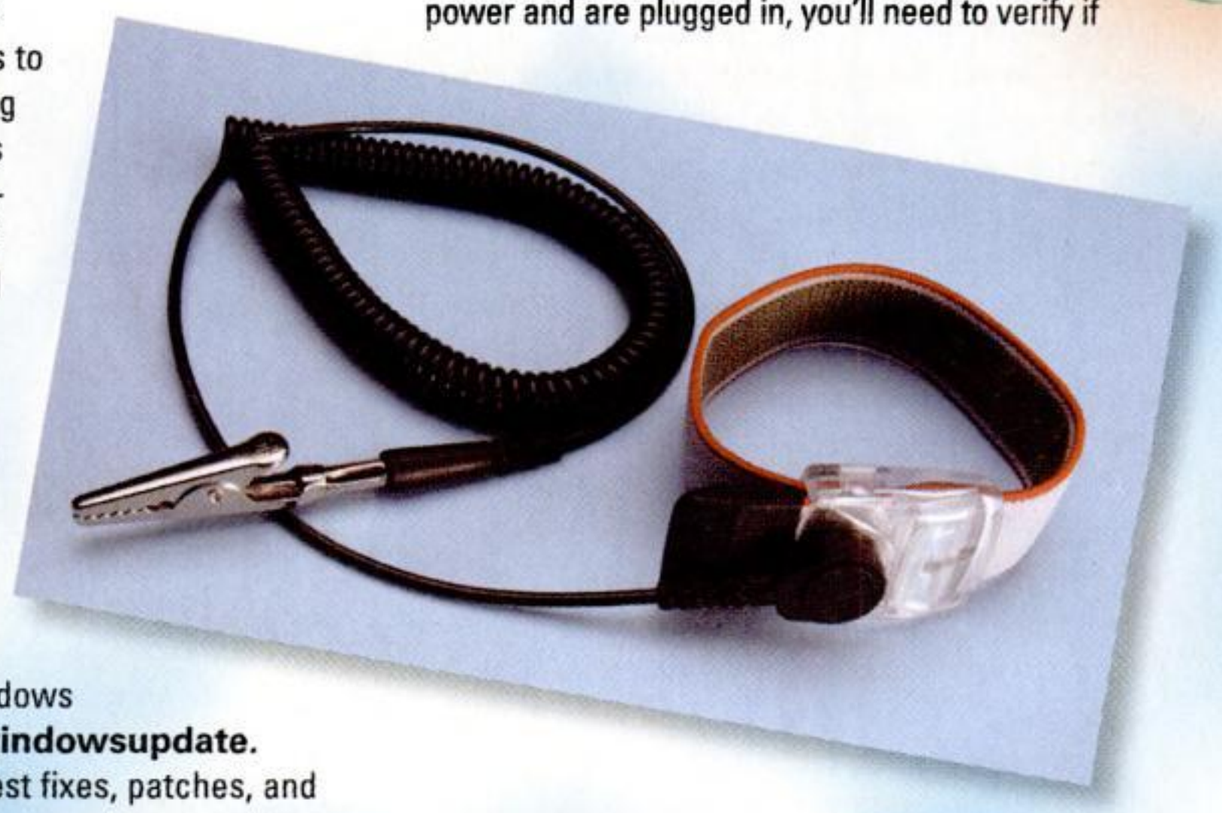
The keyboard doesn't work.

If you're having problems with a USB keyboard, check to be sure that "USB Legacy Support" is enabled in the BIOS. If you're still having problems, make sure you have installed the latest BIOS for your motherboard and any Windows updates from Microsoft as well. Some older systems can never properly use a USB keyboard, in which case you should change to a PS/2 keyboard instead. Some keyboards feature both USB and PS/2 interfaces, which offers the flexibility to connect to pretty much any system.

If the keyboard is a PS/2 type and is having problems, the quickest way to verify whether the problems lie with the keyboard or the motherboard is to replace the keyboard with a known-good spare. If the spare keyboard doesn't work, then most likely the keyboard controller on the motherboard is defective, meaning the entire board will need to be replaced.

I can't hear any sound from the speakers.

This can often be as simple as the speakers being unplugged or powered off, so don't overlook the obvious! Also check the volume controls in Windows or your application to ensure they're turned up and not muted. Once you're sure the volume is turned up and that your speakers have power and are plugged in, you'll need to verify if



The classic ESD (electro-static discharge) strap. Think of it like this—would you want your doctor to perform internal surgery without washing his hands? No, you would not. So don't put your delicate components at risk from static electricity. You do not, by the way, need to have your PC plugged in for the strap to work. $5, www.radioshack.com

#5 Alcohol may help with Law #2, but it won't help you troubleshoot more effectively.

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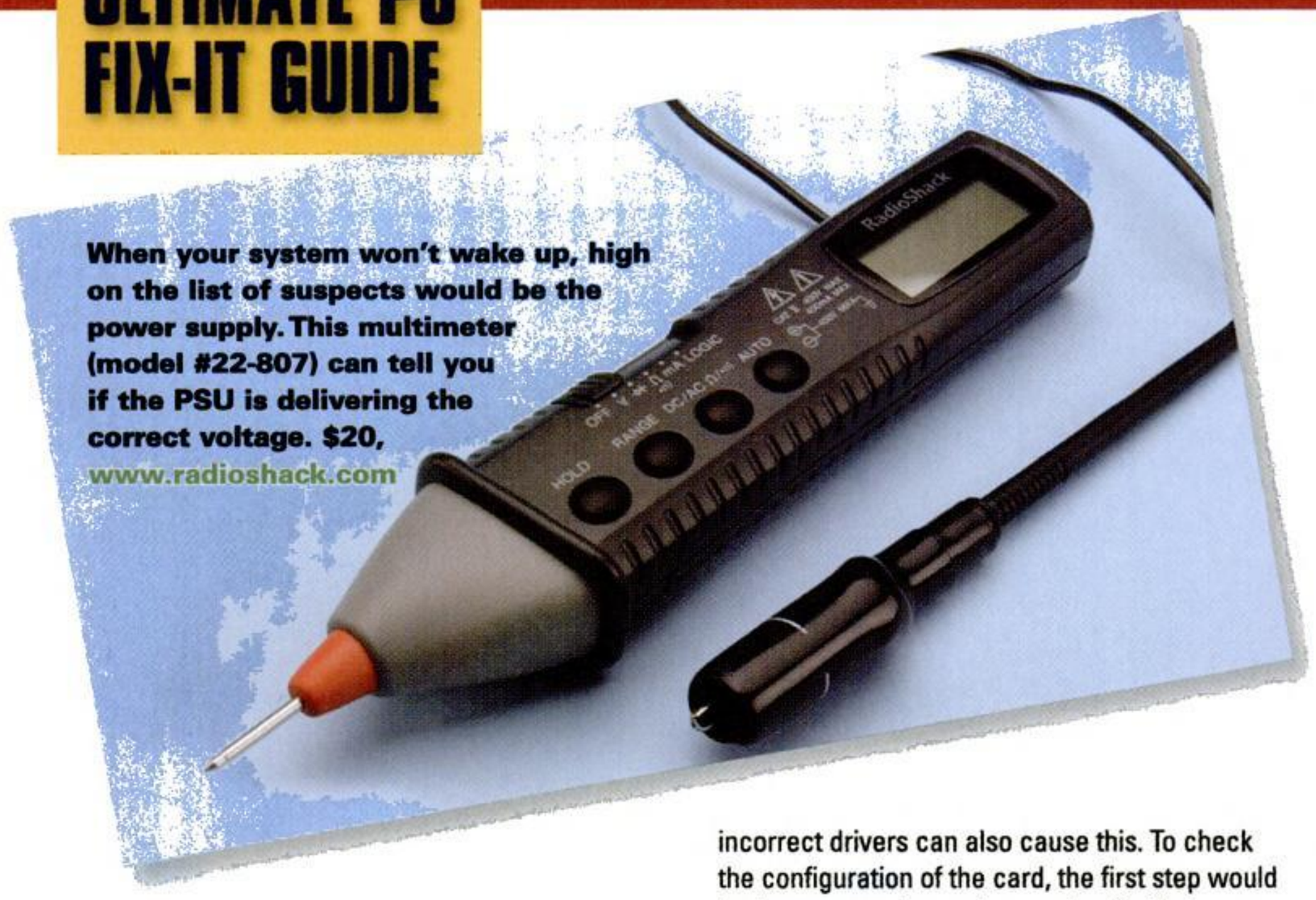


When your system won't wake up, high on the list of suspects would be the power supply. This multimeter (model #22-807) can tell you if the PSU is delivering the correct voltage. $20, www.radioshack.com

the problem is with the speakers or the soundcard.

First, connect different known-good speakers. If you still get no sound, then clearly the issue is in the soundcard, possibly with the configuration of the card, or else the card itself may be defective. First try clearing the ESCD (enhanced system configuration data) in the BIOS setup. This will essentially force the plug-and-play routines to reconfigure the system, which may resolve any conflicts. If that doesn't help, try removing and reinstalling the soundcard drivers. Finally, if that doesn't help, try physically removing and replacing the card from the system. You might try replacing it first in the same slot, then in a different slot, as sometimes there can be timing issues from one slot to the next. If that doesn't work, try replacing the card.

If your sound controller is integrated into the motherboard, first try the ESCD reset and driver reinstallation. If that doesn't work, then disable the integrated sound and install a replacement card or a replacement motherboard.

If your problem occurs only when playing audio CDs, check for a proper cable connection between the soundcard and CD drive. If there's no cable, then check the Properties for the drive in the Device Manager to see if "digital CD audio" is enabled. If your system will not allow digital CD audio to be enabled, then you'll need to install an analog cable connected between the soundcard and the CD drive.

The monitor appears completely garbled or unreadable.

A completely garbled screen is most often due to improper, incorrect, or unsupported settings for the refresh rate, resolution, or color depth. Using incorrect drivers can also cause this. To check the configuration of the card, the first step would be to power on the system and verify that you can see the POST (or system splash screen). If the screen looks fine during the POST, but goes crazy once Windows starts to load, then almost certainly the problem is due to an incorrect setting or configuration of the videocard. To resolve this, boot the system in Windows "Safe Mode" (hold down the F8 key as Windows starts to load). This will bypass the current video driver and settings, and place the system in default VGA mode. Once the Windows Desktop appears, you can right-click the desktop, select Properties, and then reconfigure the video settings or change drivers.

If the problem occurs from the moment you turn on the system, then you definitely have a hardware problem—most likely involving the videocard, video cable, or monitor. First try replacing the monitor with another one, and if the cable is detachable, try replacing that too. If replacing the monitor and cable doesn't solve the problem, then the videocard is probably defective. Try replacing the card (or, if it's a PCI-based card, try moving it to a different slot). If the video is integrated into the motherboard, then you'll have to try adding a separate card instead. Or you can replace the motherboard.

The image on the display is distorted: bent, shaking, or wavering.

This can often be due to problems with the power line, such as an electric motor, air conditioner, or refrigerator causing interference. Try replacing the power cord, plugging the monitor and/or the system into a different outlet, or moving it to a different location entirely. I've also seen distortion caused by local radio transmitters, or by two-way radios being operated in the vicinity of the system.

If the monitor image is bent and discolored, it could be due to the shadow mask being magnetized. Try turning the monitor on and off repeatedly, which will cause the built-in degaussing coil around the perimeter of the tube to activate in an attempt to demagnetize the shadow mask. If this seems to work partially but not completely, you may need to obtain a professional degaussing coil from an electronics or TV service shop to demagnetize the mask. Next, try replacing the monitor cable, try a different known-good monitor, and, finally, try replacing the videocard.

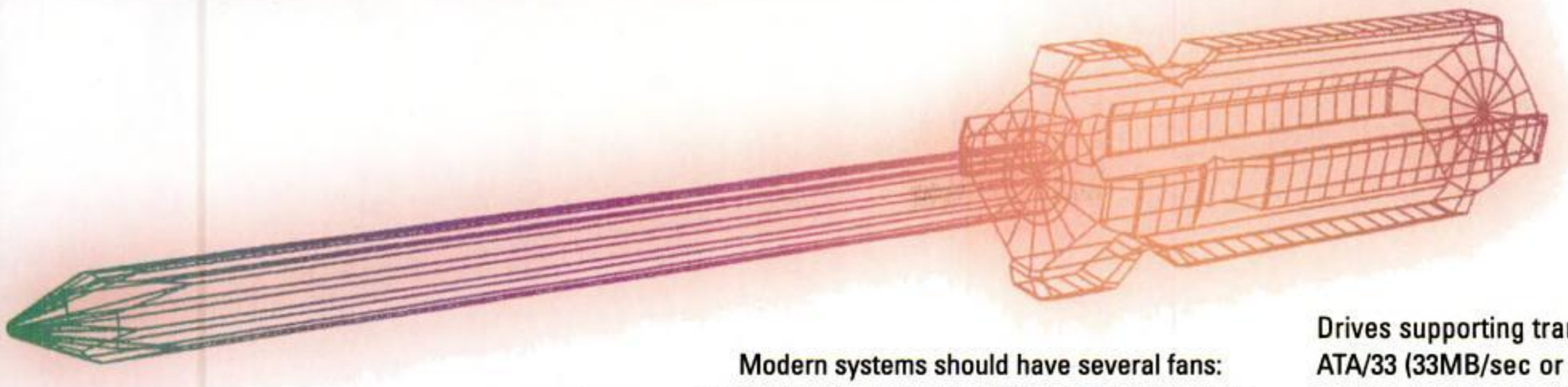
I installed an upgraded processor but it won't work.

First make sure the motherboard supports the processor that's installed, and that you're using the latest BIOS. Check with the motherboard manufacturer to see if any BIOS updates are available for download, and if so, install them.

Check the jumper settings (on older boards) or BIOS screens to verify that the processor is identified and set properly with respect to the frontside bus speed, clock multiplier, and voltage settings. Make sure the processor is set to run at its rated speed and isn't overclocked. If any of the CPU settings in the BIOS setup are on manual override, try setting them to automatic. Try reseating the processor in the socket. Make sure the heatsink is properly installed, and that you're using thermal interface material (thermal grease) at the mating junction between the CPU and heatsink. And, of course, always consider the following:

- The CPU must fit in the socket! Most Pentium 4 and newer Celeron processors use Socket 478; Pentium III and older Celerons use Socket 370; and Athlon/Duron processors use Socket 462 (Socket A).
- The motherboard must support the voltage required by the CPU. Modern

#6 Do not touch your PC until you are completely calm.



motherboards set voltages by reading VID (voltage ID) pins on the processor, and then setting the onboard VRM (voltage regulator module) to the appropriate settings. Older boards may not support the generally lower voltage requirements of newer processors.

- The motherboard ROM BIOS must support the CPU. Modern boards also read the CPU to determine the proper bus speed and multiplier settings for the CPU. Many CPUs have different requirements for cache settings and initialization, as well as bug fixes and work-arounds.

- The motherboard chipset must support the CPU. In some cases, specific chipset models or revisions may be required to support certain processors.

- Often there will be BIOS updates available that may allow newer processors to be supported in older boards, beyond what was originally listed in the manual when you purchased the board.

- If you're considering replacing an existing Pentium 4 with a new Hyper-Threading technology version, you need to verify that the motherboard supports the new processor. Specifically, the board will need to have one of the more recent chipsets, it must support a 533MHz bus speed, and it must incorporate a setting in the BIOS to enable or disable the Hyper-Threading technology. Some pre-existing boards may be able to do this with only a BIOS upgrade, but other boards will not meet the chipset and FSB requirements.

The system runs fine for a few minutes, then freezes or locks up.

This is the classic symptom of an overheated system. If the system is brand-new or custom-built, then it's possible that the design is insufficient for proper cooling, and bigger heatsinks, more fans, or other solutions may be required. If the system once worked fine, but is now exhibiting the problem, then check to see if the problem started after any recent changes were made, such as the installation of new video drivers. If so, then the change could be the cause of the problem. If not, then most likely something like a cooling fan has either failed or is beginning to fail.

Modern systems should have several fans: one inside the power supply, one on the CPU (or positioned to blow on the CPU), and optionally others for the chassis. Verify that any and all fans are properly installed and spinning. They shouldn't be making grinding or growling noises, which normally indicates bearing failure. Note that many newer systems have thermostatically controlled fans, and it's normal for the fan speeds to change with the temperature. Make sure that the chassis is several inches from any walls, and that fan ports are unobstructed.

Try removing and reseating the processor. Reinstall the CPU heatsink with new thermal interface material. Check the power supply, and verify that it's rated sufficiently to power the system (most supplies should be 300 watts or more). Use a digital multimeter to verify the voltage outputs of the power supply; they should be within plus or minus 5 percent of the rated voltage at each pin. Try swapping the power supply with a high-quality replacement or known-good spare.

I purchased an upgraded AGP videocard and it won't fit in the slot.

Most newer AGP cards are designed to conform to the AGP 4x or AGP 8x specifications, which run on only 1.5 volts. Most older motherboards with AGP 2x slots are designed to accept only 3.3-volt cards. If you plugged a 1.5-volt card into a 3.3-volt slot, both the card and motherboard could be damaged, so special keys were incorporated into the AGP spec to prevent disasters. Normally the slots and cards are keyed such that 1.5-volt cards will fit only in 1.5-volt sockets, and 3.3-volt cards will fit only in 3.3-volt sockets. There are also universal sockets that will accept either type of card.

I'm experiencing intermittent problems with the hard drive.

Most systems use ATA (commonly called IDE) hard drives, which consist of a drive and integrated controller, a ribbon cable, and a host adapter circuit in the motherboard. Most often, intermittent problems are found with the cable and the drive. It is far more rare that the host adapter will fail or exhibit problems. Many problems occur with the cables. ATA drives use either 40-conductor or 80-conductor cables.

Drives supporting transfer rates higher than ATA/33 (33MB/sec or Ultra DMA Mode 2) must use 80-conductor cables. Check the cable to be sure it's not cut or damaged, and try replugging it into the drive and motherboard. Make sure that the cable isn't more than 18-inches in length, which is the maximum allowed by the ATA specification. This is especially important when you're using the faster ATA/100 or ATA/133 transfer rates. Try replacing the cable with a new 80-conductor, 18-inch version.

If replacing the cable doesn't help, try replacing the drive with a spare, installing an OS, and testing it to see if the problem remains. If so, then the problem is with the motherboard, which will most likely need to be replaced. If not, then the problem is most likely with your original drive. You can simply replace it, or try testing, formatting, and reinstalling to see if the drive can be repaired. To do this you will need the test software provided by the drive manufacturer. Here's where the popular drive companies keep their utilities:

- **Seagate—ftp://ftp.seagate.com/techsuppt/seagate_utils/sgatfmt4.zip or www.seagate.com/support/seatools**

- **IBM—www.storage.ibm.com/hdd/support/download.htm**

- **Maxtor/Quantum—www.maxtor.com/**

- **Western Digital—www.wdc.com/service/ftp/drives.html or www.wdc.com/service/ftp/wddiag/wd_diag.exe**

If any problems are found, use the option in the software to initialize or low-level format (LLF) the drive. Note that this will wipe *everything* off the drive, so you'll want to back up any files you wish to preserve. After the LLF, you'll need to partition the drive, format each partition (high-level format), then install the OS, drivers, applications, and backed-up data. If you're using Win98 or a later Windows OS on an original Microsoft bootable CD with a system that supports (and which is configured for) CD booting, you can simply boot to the OS CD immediately after the LLF. The OS installation routines will prompt you through the partitioning and formatting process as part of the installation. After the OS installation, you'll need to install your hardware drivers and applications, and then restore your data files. If the drive still exhibits problems after reformatting, then you'll have to replace the drive.

Note that you can run the *IBM DFT* (drive fitness test) program (available for free from

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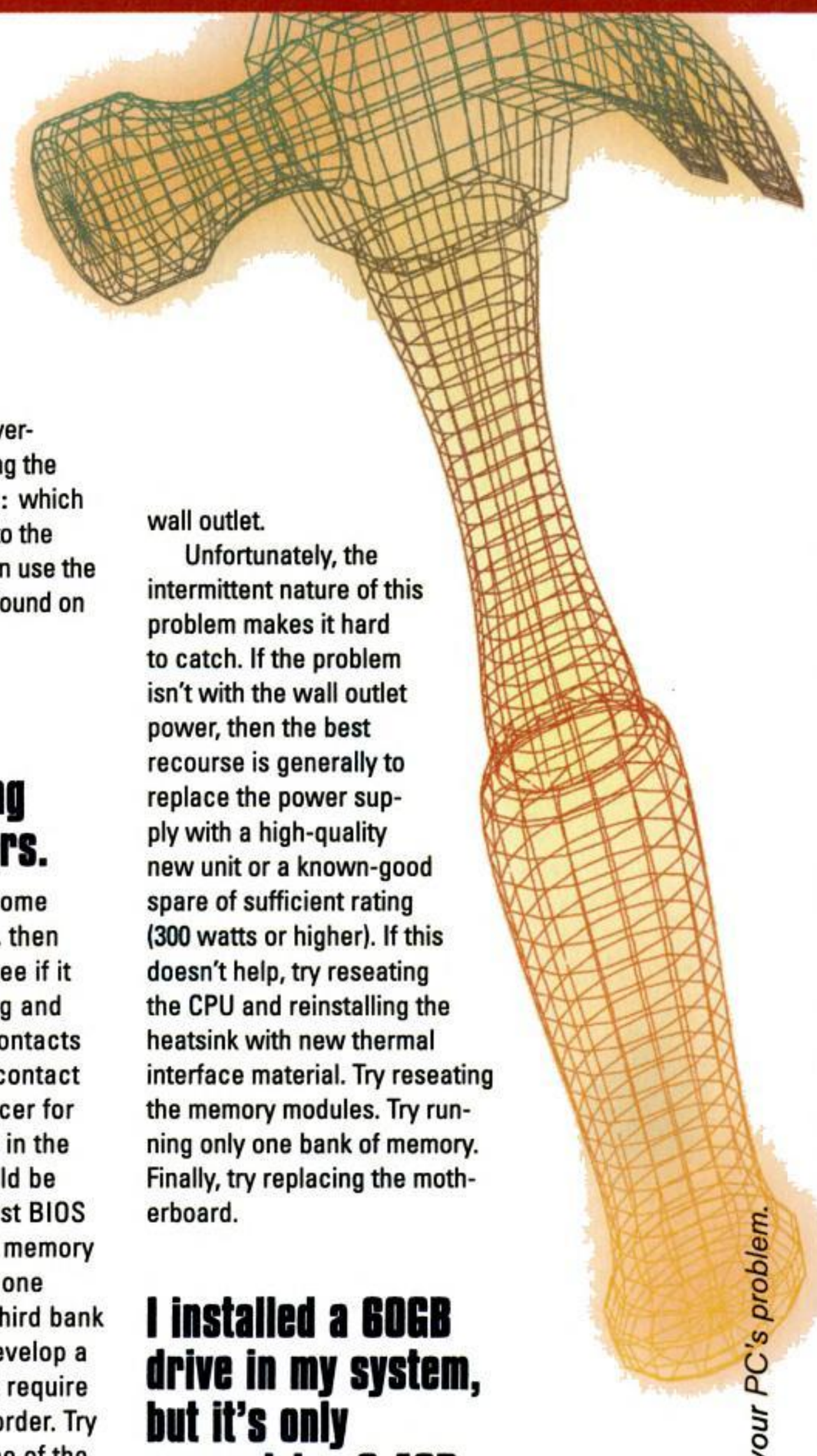

the IBM site) on non-IBM drives. The program, however, will not be able to repair or LLF these drives. Still, the program is a good test of any drive—more in-depth than *Scandisk* or other utilities provided with Windows.

The system won't boot. It says "Missing operating system" on the screen.

When your system boots, it reads the first sector from the hard disk, called the MBR (master boot record), and runs the code contained in that sector. The MBR code then reads the partition table (also contained in the MBR) to determine which partition is bootable and where it starts. Then it loads the first sector of the bootable partition (called the volume boot record, or VBR), which contains the OS-specific boot code. But before executing the VBR, the MBR checks to be sure the VBR ends with the signature bytes "55Aah." The "Missing operating system" message will be displayed by the MBR if it finds that the first sector of the bootable partition (the VBR) doesn't end in "55Aah." Several things can cause this to occur:

▶ The drive parameters entered in the BIOS are incorrect or corrupted. Incorrect parameters will cause the MBR program to translate differently and read the wrong VBR sector, thus displaying the error message. A dead CMOS battery can also cause this, since it will lose or corrupt the stored drive translation and transfer mode parameters. In fact, in my experience, a dead battery is one of the more likely causes.

▶ The drive isn't yet partitioned and formatted on the system. This is a normal error if you try to boot the system from the hard disk before the OS installation is complete. Boot to an OS startup disk (floppy or CD), and run the SETUP program, which will prompt you through the partitioning and formatting process.

▶ The MBR and/or partition tables are corrupted. This can be caused by boot sector viruses, among other things. To repair, cold boot from a known-good, non-infected, write-protected floppy or bootable CD containing the *FDISK* program (preferably Win98 or later). Enter "FDISK /MBR" at the command prompt, which will recopy the MBR code but not alter the partition table. Reboot. If the message persists, and you need to recover the data on the drive, you'll either need to rebuild the partition tables from scratch using a third-party utility like the *DISKEDIT* program included with Symantec's *Norton Utilities*, or hire a data-recovery specialist who can do this for you. If you don't need to recover the data on the drive, then simply reinstall the OS from scratch.

▶ The VBR is corrupted. To repair with Windows 95/98/ME, secure a bootable floppy created by the same OS version that's on the hard disk, and containing the SYS command from that OS. Run `SYS C:` which will recopy a good VBR and system files to the volume. For Windows NT/2000/XP, you can use the *Recovery Console* or *DiskProbe* utilities (found on the bootable OS CD).

The system is experiencing intermittent memory errors.

If the memory was recently added or some other change was made to the system, then I would undo that addition/change to see if it was the cause. If not, then try removing and reseating all memory modules. If the contacts look corroded, try cleaning them with contact cleaner, and then apply contact enhancer for protection. Check the memory settings in the BIOS setup: generally all settings should be on automatic. Try upgrading to the latest BIOS for your motherboard. Try removing all memory except one bank. Next try running just one bank of memory, but in the second or third bank position. It's possible for a socket to develop a problem, and most motherboards don't require that the sockets be filled in numerical order. Try replacing the remaining module with one of the others that were removed, or a new module, or a known-good spare.

If you get this far, then the problem is most likely either the motherboard or the power supply, or possibly some other component in the system.

The system locks up frequently and sometimes reboots on its own.

This is one of the classic symptoms of a power supply problem. The power supply is designed to send a special "power-good" signal to the motherboard when it has passed its own internal tests and outputs are stable. If this signal is dropped, even for an instant, the system will reset. Problems with the power-good circuit will cause lockups and spontaneous rebooting. This can also be caused if the power at the wall outlet isn't correct. Try verifying the power supply output with a digital multimeter. Use a tester for the wall outlet to be sure it's properly wired, and verify that the voltage is near 120V. Try replacing the power cord or power strip between the power supply and the wall outlet.

Unfortunately, the intermittent nature of this problem makes it hard to catch. If the problem isn't with the wall outlet power, then the best recourse is generally to replace the power supply with a high-quality new unit or a known-good spare of sufficient rating (300 watts or higher). If this doesn't help, try reseating the CPU and reinstalling the heatsink with new thermal interface material. Try reseating the memory modules. Try running only one bank of memory. Finally, try replacing the motherboard.

I installed a 60GB drive in my system, but it's only recognizing 8.4GB.

Motherboard ROM BIOSes have been updated throughout the years to support larger and larger drives. The following capacity limits were broken in the following months: 528MB in August 1994; 8.4GB in January 1998; and 137GB in September 2002.

You can use the BIOS Wizard utility from **www.unicore.com/bioswiz/index2.html**, which will tell you the BIOS date of your system and whether your system supports the "Enhanced Hard Disk Drive" specification, which means drives over 8.4GB. If your BIOS doesn't support EDD (drives over 8.4GB), then there are four possible solutions: upgrade your BIOS to a version that supports more than 8.4GB; install a BIOS flash upgrade card like the ATA Pro Flash; install a software patch to add 8.4GB support; or buy a new PC (it's probably high time).

I almost never recommend the third solution, as it merely installs a software patch in the boot sector area of the hard drive, which can result in numerous problems when booting from different drives, installing new drives, or recovering data.

The 137GB barrier is a bit more complicated because there are not only BIOS issues, but also

The PC part that is acting up is not necessarily the source of your PC's problem.

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OS and chipset-based ATA host adapter driver issues. Drives larger than 137GB are accessed using 48-bit LBA (logical block address) numbers, which require BIOS support, chipset driver support, and operating systems support. Generally, you will need a BIOS with 48-bit LBA support (normally dated September 2002 or newer), the latest chipset drivers, and Windows XP with Service Pack 1 installed. The original version of WinXP—as well as Win2000/NT and Win95/98/ME—doesn't currently provide native support for hard drives that are larger than 137GB.

If you have a system without proper BIOS support, check with your motherboard manufacturer for an update. Optionally, you can use an add-in controller card with an onboard BIOS, such as the Ultra ATA 133 PCI card from Maxtor. If your motherboard uses a non-Intel chipset, check with the motherboard or chipset manufacturer for driver updates to enable 48-bit LBA support.

MyCD-ROM/DVD drive doesn't work.

Optical drives are some of the more failure-prone components in a PC. It's not uncommon for one to suddenly fail after a year or so. If you're having problems with a drive that was newly installed, check the installation and configuration of the drive. Check the jumper settings; if using an 80-conductor cable, then, generally, the drive should be jumpered to Cable Select. If using a 40-conductor cable, then the drive should normally be set to either Master or Slave (depending on whether it's the only drive on the cable).

Check the cable to be sure it's not nicked or cut, and is a maximum of 18-inches long. Try replacing the cable with a new one or a known-good spare (use an 80-conductor cable if at all possible). Make sure the drive power is connected, and verify that power is available at the connector using a digital multimeter. Make sure the BIOS is set properly for the drive, and verify that the drive is detected during the boot process.

If the drive had already been installed and was working before, then first try reading different discs, preferably commercially stamped discs rather than writeable or rewriteable ones. Not all drives will read all discs.

My USB port or device doesn't work.

Make sure you've enabled the USB ports in the BIOS. Make sure your operating system supports USB (Win95 and NT do not, while Win 98 and later do). Try removing any hubs and plugging the USB device directly into the main USB ports of your system. Try replacing the USB cable. Many USB devices require additional power, so ensure that your device has an external power supply connected if one is required.

I installed an additional memory module, but the system doesn't recognize it.

Verify that the memory is compatible with your motherboard. There are many subtle variations on memory types that may appear to be identical on the surface (just because it will fit in the slot doesn't mean it will work properly with your system!). Check your motherboard manual for the specific type of memory your system requires, and possibly for a list of supported modules. You can visit **www.crucial.com** and use their memory selector to determine the exact type of memory for a specific system or motherboard. Also note that all motherboards have limits to the amount of memory they will support: many boards today will only support up to 512MB or 1GB. Again, consult the motherboard manual or manufacturer for information on the limits for your board.

If you're sure you have the correct type of memory, then follow the memory troubleshooting steps listed previously for intermittent memory problems.

I installed a new drive. It doesn't work and the drive LED remains lit.

This is the classic symptom of a cable plugged in backwards. Both ATA and floppy drives are designed to use cables with keyed connectors. However, there are cables available that lack this keying, which means they can easily be installed backwards. When the cable is installed backwards into either the motherboard or the drive, the LED on the drive will remain lit and the drive will not function.

While I was updating my BIOS, the system froze and now the system is dead!

This can occur when a flash ROM upgrade goes awry. Fortunately, most motherboards have a recovery routine, which can be enabled via a jumper on the board. When enabled, the recovery routine will normally cause the system to look for a floppy with the BIOS update program on it. If you haven't done so already, you'll need to download an updated BIOS from the motherboard manufacturer and follow the directions for placing the BIOS update program on a bootable floppy. Next set your motherboard for BIOS recovery mode via a jumper, power on the system, and wait until the procedure completes. It will normally take up to five minutes, and you may hear beeping to indicate the start and end of the procedure. Once the recovery is complete, turn off the system and restore the recovery jumper to the original (normal) setting.

If your motherboard doesn't feature BIOS recovery capability, then you may have to send the board to the manufacturer for repair. ■

#9 Check your cables first: Sometimes the fix is much simpler than you think.

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XP Troubleshooting Secrets

How to fix your OS woes using XP's built-in troubleshooting and diagnostic tools

BY SCOTT MUELLER

Your car has, oh, about 50,000 individual parts. That's 50,000 opportunities for something to go wrong, and 50,000 guesses at what your problem might be.

Windows XP, on the other hand, has more than 45 million lines of code. If you think of these lines as "parts" within the OS, and consider that these "parts" are often altered by apps you install or corrupted by disk failures, brownouts, or bad juju, then you can see why your system goes awry so often.

Fortunately, getting WinXP back up to speed is a lot less expensive and painful than doing the same with your comparatively simple automobile. That's because Microsoft includes error-reporting features, diagnostic programs, and utilities that can help you root out the cause of a system snafu—all before resorting to the dreaded reinstall (which you no longer need to fear, if you read our story that starts on page 36).

We're going to show you how to decode the error messages left behind by Windows XP after it crashes, and explain how to use the tools built into the OS to become your own mechanic. You'll be diagnosing problems, recovering from system mishaps, and maintaining a working machine in no time.

What Is Windows XP Trying to Tell Me?

The most serious PC problems are caused by corrupt files and buggy software, as well as defective or incorrectly configured hardware. These problems often result in a STOP or Blue Screen of Death. The resulting "screen dump" is a frustrating and cryptic string of letters and numbers. But often these messages can be decoded to provide some useful information. For example, say you're working on a system that STOPs (blue-screens) with the following message:

```
STOP: 0x0000002E
(0x00699F11, 0x04EBD77F,
0x00000000, 0x80ADD9C8)
DATA_BUS_ERROR
```

The best thing to do when you get a STOP or blue-screen error like this one is to look up the error code (the first string of letters and numbers after STOP:) in the Microsoft Knowledge Base at http://support.microsoft.com. There you'll find articles that will help you decode the specific error you're receiving, and helpful information about troubleshooting the problem.

The Knowledge Base tells us that the 0x0000002E code indicates a parity error detected in memory. An error like this is normally caused by problems with memory, but can also be caused by other hardware such as a videocard, a failing hard disk, a boot sector virus, or even a defective device driver. The message in our example includes four parameters (in the parentheses) that provide valuable information. The parameters for this error are decoded as follows:

- *Virtual address of the fault (0x00699F11)*
- *Physical address of the fault (0x04EBD77F)*
- *Processor Status Register contents (0x00000000)*
- *Faulting Instruction Register contents (0x80ADD9C8)*

Of these, the second one (the physical address) is the most useful, as it indicates the exact location in memory where the fault occurred. In this case, the address is 0x04EBD77F, which is a hexadecimal number that translates to 82,564,991 in decimal, which if you divide by 1,048,576 (number of bytes in a megabyte) places the error at 78.74 as a megabyte address, which is the same as saying the error is in the 79th megabyte (addresses start with 0). If you have two 128MB DIMMs in the system, then this places the error in the first bank of the two installed.

Now if this error reoccurs, and the address is the same every time, then the problem is most likely the memory module, which should be replaced. If the error reoccurs but the address is always different, then I would suspect other hardware or software in the system instead of just the memory modules.

While not all STOP errors use the parameters in the same manner, the first place to start is always the Microsoft Knowledge Base. Hey, they're the ones that came up with these codes in the first place!

#10 *Technically, cussing will not help, but it may make you feel better. Just close your office door first.*

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Better Living through Device Management

The Device Manager is the software component of the plug-and-play standard, and it should be the first place you look if you're having problems installing a new piece of hardware, or to resolve conflicts between devices. You can use Device Manager to see a graphical view of the hardware that's installed in your computer, get detailed listings of resource usage, update hardware device drivers, change settings, and troubleshoot problems. To open Device Manager, select Start > Control Panel > Performance and Maintenance > System. On the Hardware tab, select Device Manager.

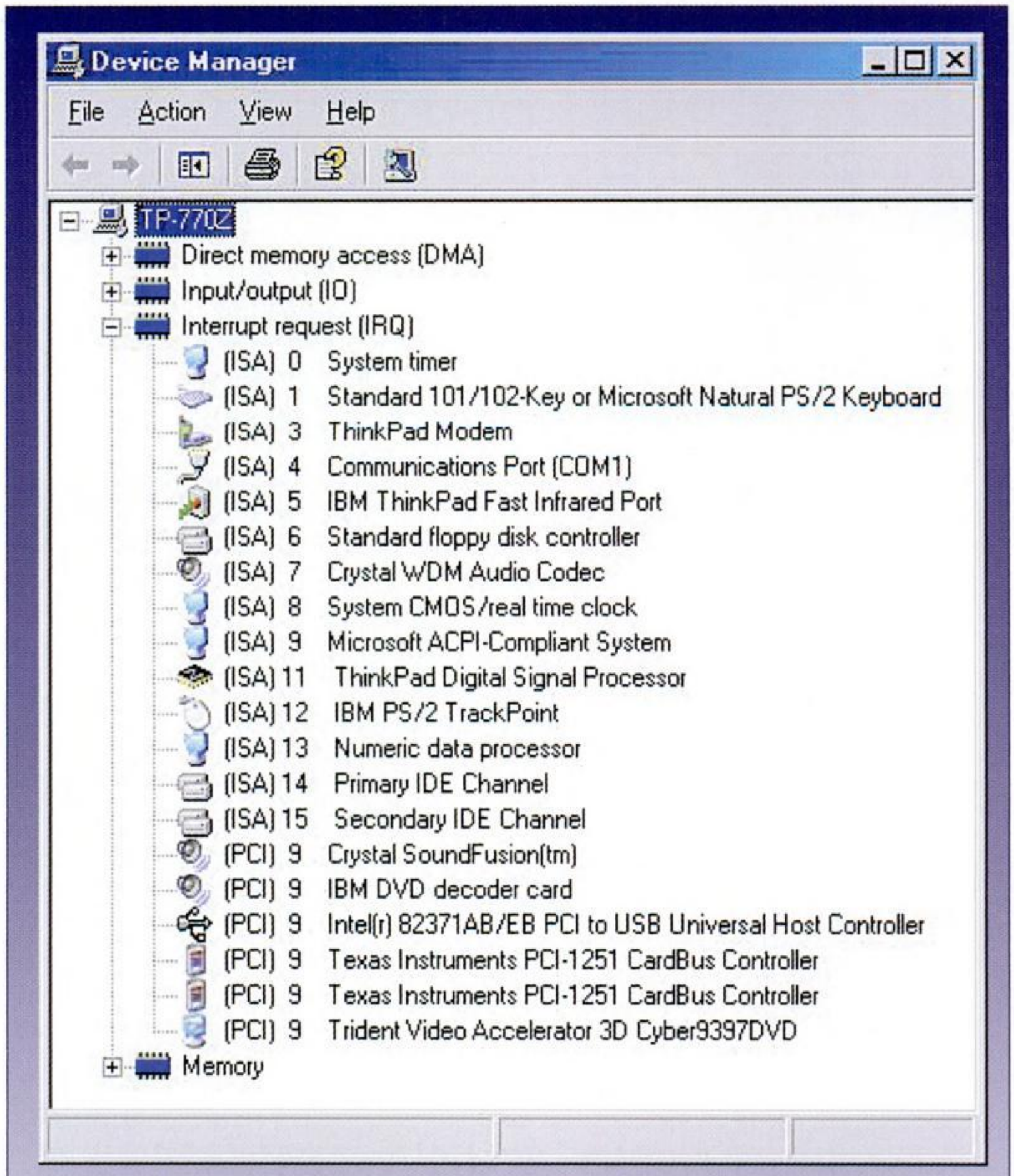
The primary uses for Device Manager include:

- *Check to see if the installed hardware is recognized and working properly.*
- *Change hardware resource configuration and device settings.*
- *Identify installed drivers.*
- *Install updated drivers.*
- *Enable, disable, or uninstall hardware devices.*
- *Roll back to a previous driver version.*
- *Print a summary of the devices that are installed on your computer.*

Normally, the automatic plug-and-play features in Device Manager will properly configure all the installed hardware in such a way that there are no conflicts. This is especially true in newer systems running WinXP. It's rare that you'll need to manually edit or modify the resource allocation of devices. In general, the settings should be left on automatic. By setting resources manually, you risk causing problems, and your system may even lock up. If that happens, try starting in Safe mode: Reboot the PC, and hold down the F8 key while the system restarts to access the Safe mode option, then open the Device Manager and reset everything back to automatic. Once you restart, the plug-and-play routines will take over and should resolve any critical conflicts.

Another useful feature of the Device Manager is that it lets you see resource usage at a glance. For example, to check for any IRQ resource conflicts, go to the View menu, select Resources by type, and then click Interrupt Request.

An IRQ is a signal that a device uses to gain the attention of the processor. Most all devices that communicate data to and from the system will require an IRQ, since they will need to request the attention of the processor as data comes in. Without this type of design, buffers on the device may overflow before the processor decides to check to see if the device needs attention. Older ISA bus devices can't normally share IRQs, while PCI devices can share them. Problems can occur if you have a lot of older ISA bus devices in a system, since there are only 16 total IRQs, and many of them are reserved for specific uses. In my system, there's only one free IRQ (IRQ 10), meaning I can add only one more ISA bus device before I'll have allocation problems. On the other hand, I can add more PCI-based devices because they can all share IRQ 9. Note that the PCI bus is designed to remap shared IRQs (called IRQ steering), so having multiple devices on a single IRQ doesn't present a problem.


Device Manager
File Action View Help
TP-770Z
Direct memory access (DMA)
Input/output (IO)
Interrupt request (IRQ)
(ISA) 0 System timer
(ISA) 1 Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
(ISA) 3 ThinkPad Modem
(ISA) 4 Communications Port (COM1)
(ISA) 5 IBM ThinkPad Fast Infrared Port
(ISA) 6 Standard floppy disk controller
(ISA) 7 Crystal WDM Audio Codec
(ISA) 8 System CMOS/real time clock
(ISA) 9 Microsoft ACPI-Compliant System
(ISA) 11 ThinkPad Digital Signal Processor
(ISA) 12 IBM PS/2 TrackPoint
(ISA) 13 Numeric data processor
(ISA) 14 Primary IDE Channel
(ISA) 15 Secondary IDE Channel
(PCI) 9 Crystal SoundFusion(tm)
(PCI) 9 IBM DVD decoder card
(PCI) 9 Intel(r) 82371AB/EB PCI to USB Universal Host Controller
(PCI) 9 Texas Instruments PCI-1251 CardBus Controller
(PCI) 9 Texas Instruments PCI-1251 CardBus Controller
(PCI) 9 Trident Video Accelerator 3D Cyber9397DVD
Memory

If you look at the Device Manager for our system, you'll see a number of devices sharing IRQ 9, for example, since all of those devices are PCI-based.

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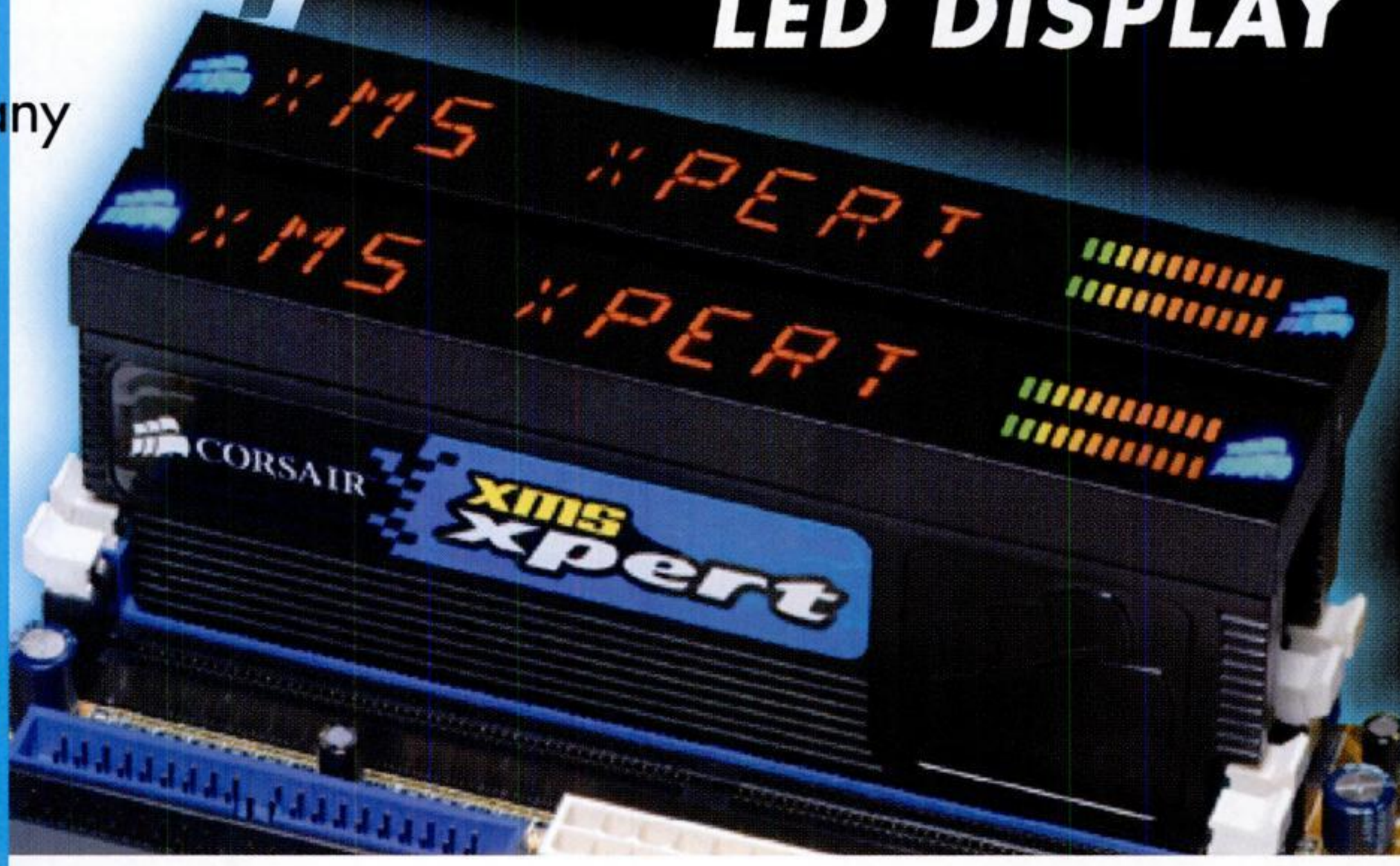

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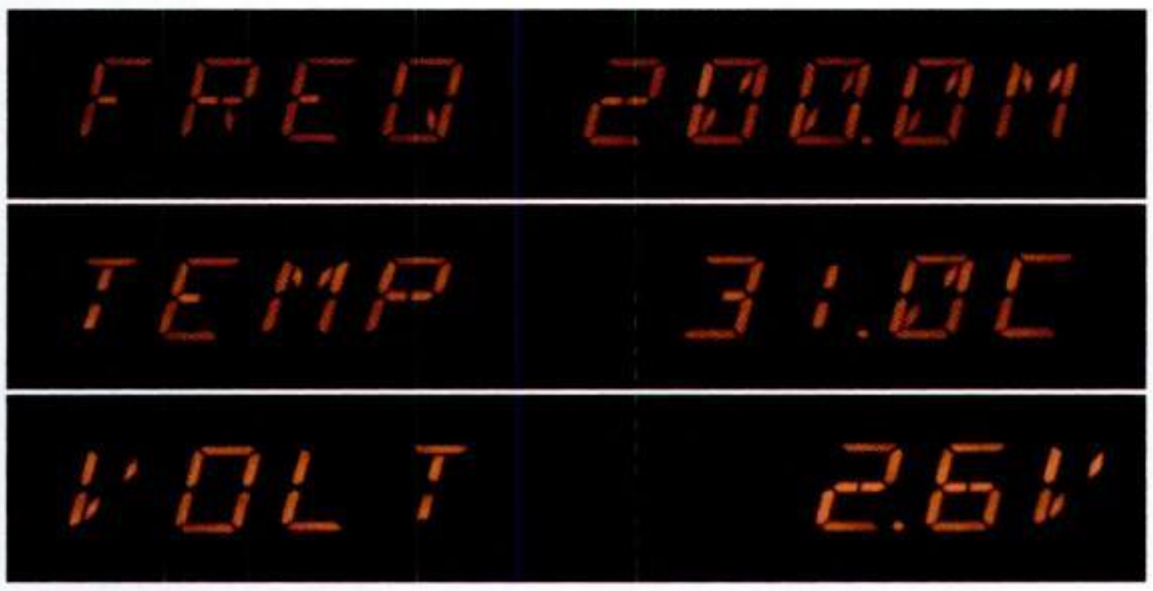

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Getting the 411 from System Information

WinXP includes a powerful System Information utility that can display system configuration information for both local and remotely connected computers. To run System Information, select Start > Programs > Accessories > System Tools > System Information. The main display in the System Information program includes the following categories:

- *Hardware Resources (similar to Device Manager)*
- *Components (hardware)*
- *Software Environment (installed drivers, programs, services)*
- *Internet Settings*

System Information will not only display the information on the screen, but it can also save or print a complete report about your system. This can be very useful if somebody is helping you troubleshoot the system remotely. By consulting the file or printout, the troubleshooter will have a lot of important information about your system that may be useful in diagnosing a problem. System Information can also be used as a launching point, from the Tools menu, for several other valuable utilities that are described in the following sections.

Network Diagnostics

Network Diagnostics is designed to collect and display information about your hardware, operating system, Internet browser and e-mail program configurations, modems, and network cards. It should be your first stop in diagnosing "connectivity" problems, and will often point you directly to the culprit.

System Restore

System Restore is a very useful tool that's designed to store and track changes made to your system. WinXP will normally create what's called a "restore point" automatically whenever you install new hardware, drivers, or software. You can also use the tool to manually create restore points anytime you like. This is similar to how many game programs allow you to save your current position, so if you "die" in the game, you can reset to the previously saved position rather than having to start over. In working with PCs, this can be a valuable timesaver. Once restore points are created, you can use the System Restore program to restore your computer to an earlier state.

File Signature Verification

The system files and drivers provided with Windows XP have a special digital signature by Microsoft, which indicates that they are original, unaltered files that have been approved by Microsoft for use with Windows. Problems can arise when installing new software or drivers on your computer, as in some cases your original files can be overwritten by unsigned or incompatible versions.

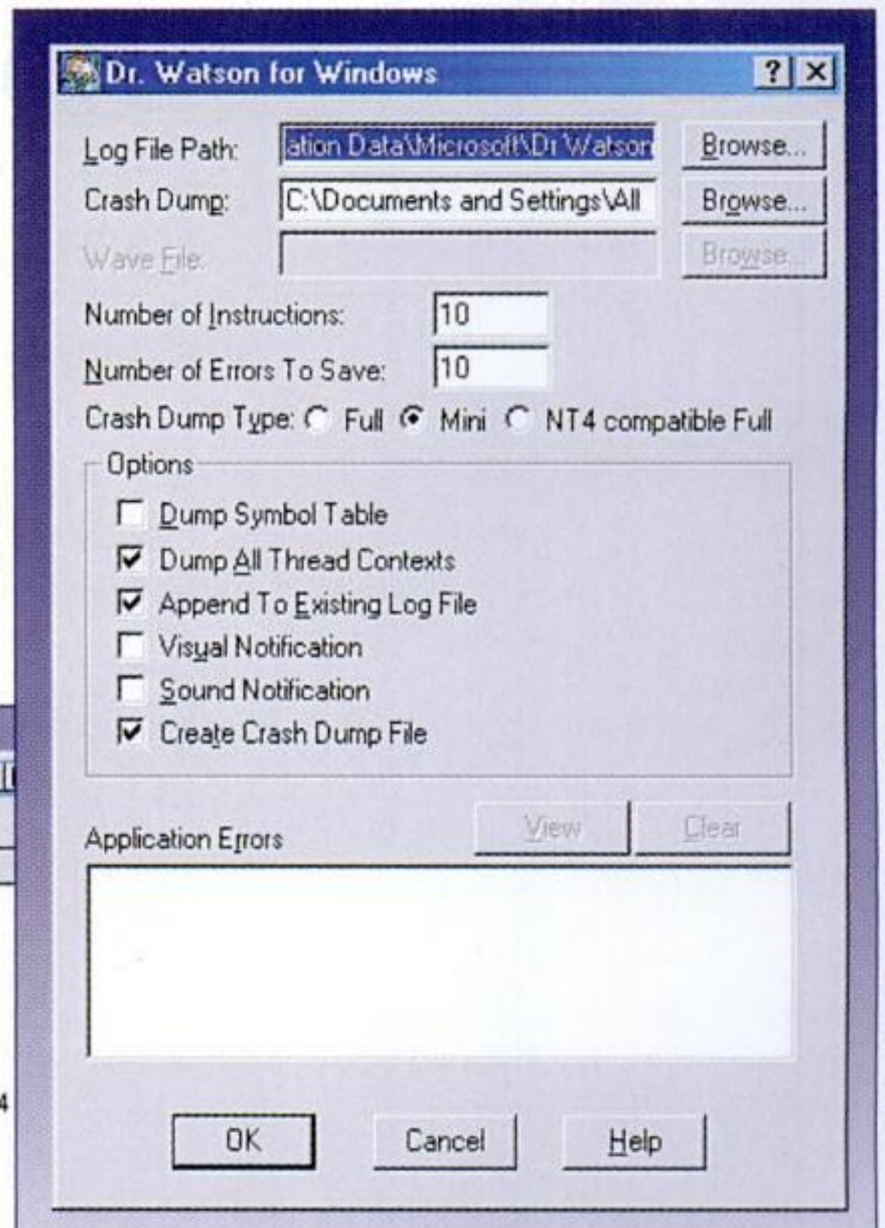
To check for problems with critical files, Windows XP provides the File Signature Verification utility, which is designed to identify and display the following information for any unsigned files on your system:

- *Filename*
- *Location*
- *Modification date*
- *Type*
- *Version number*

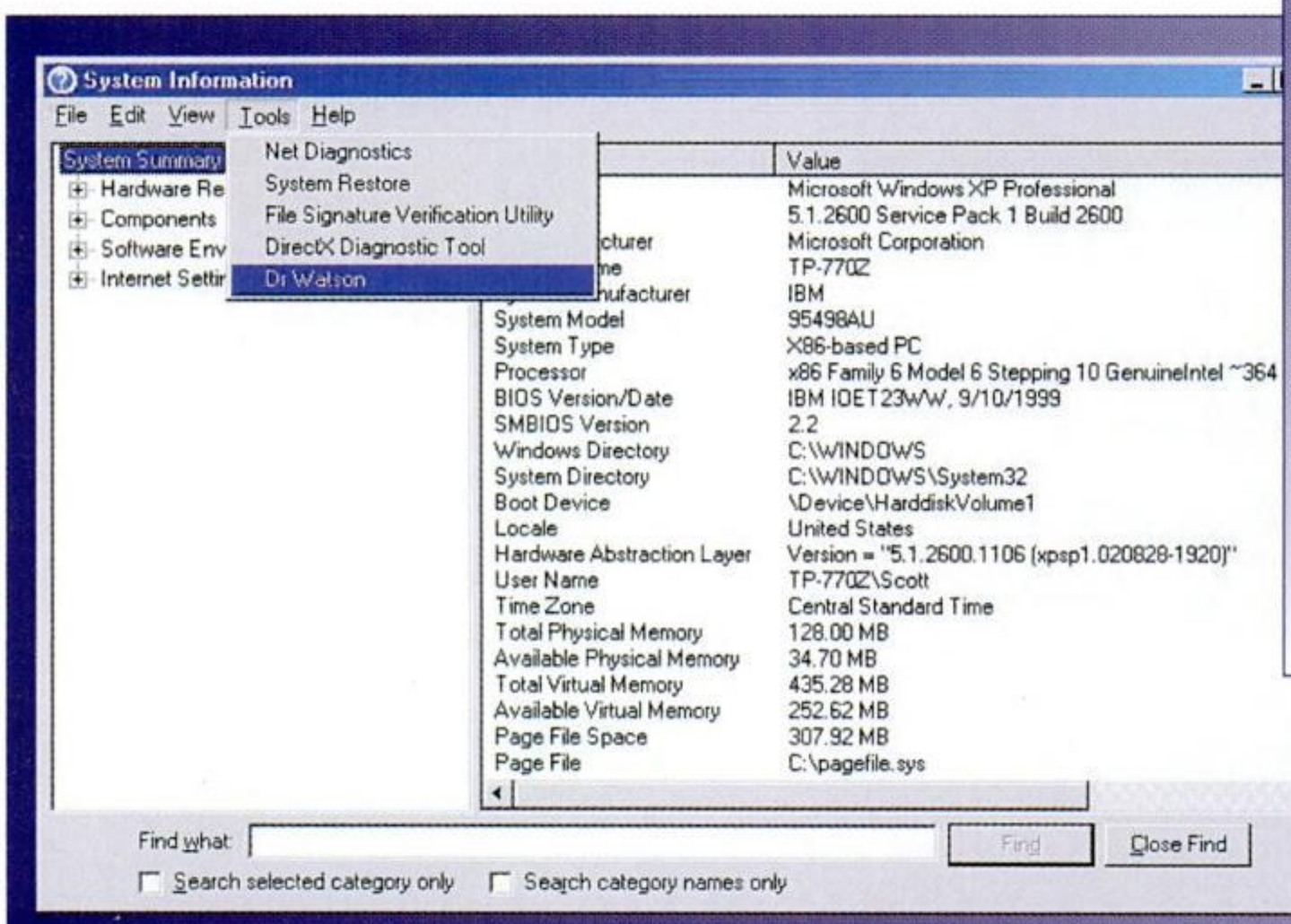
By clicking on the Advanced options, you can also root out third-party drivers that haven't been digitally signed, which means these drivers haven't necessarily been approved by Microsoft for use with WinXP. If you find drivers like these, check the manufacturer's web site for updated drivers, especially ones that have received WHQL (Windows Hardware Quality Labs) certification.

DirectX Diagnostic

Graphics and sound applications commonly use the DirectX API (application



Programs that consistently crash can be triaged with the Dr. Watson utility, which captures information about what went wrong for examination later.



The System Information utility isn't just a great resource for information about your PC. It's also a launching point for a host of great diagnostic tools.

Don't kick the dog—it's not to blame, and it won't listen dutifully if you do.

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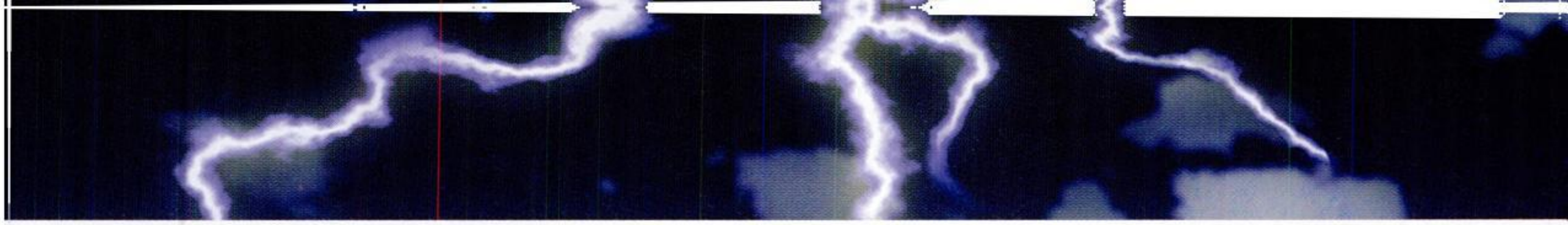


program interface) to run under Windows. Because of the variety and complexity of graphics hardware and software, there can sometimes be problems with various videocards, drivers, and programs that work with DirectX. The DirectX Diagnostic tool can give you information about the DirectX components and drivers on your system. This tool enables you to test sound and graphics output and enables you to adjust or disable certain hardware acceleration features for compatibility and testing purposes.

Dr. Watson

Dr. Watson for Windows is a software error-debugging tool designed to log information when errors occur. A text file (Drwtsn32.log) is created whenever an error is detected, and can be printed or sent to Microsoft or other software companies to help verify and resolve bugs in software.

Dr. Watson is automatically installed in your system folder when you install Windows. If a program error occurs, Dr. Watson will automatically log the error. You can also start Dr. Watson manually to change the configuration and settings for the program.

Perform Open-Heart Surgery with DiskProbe

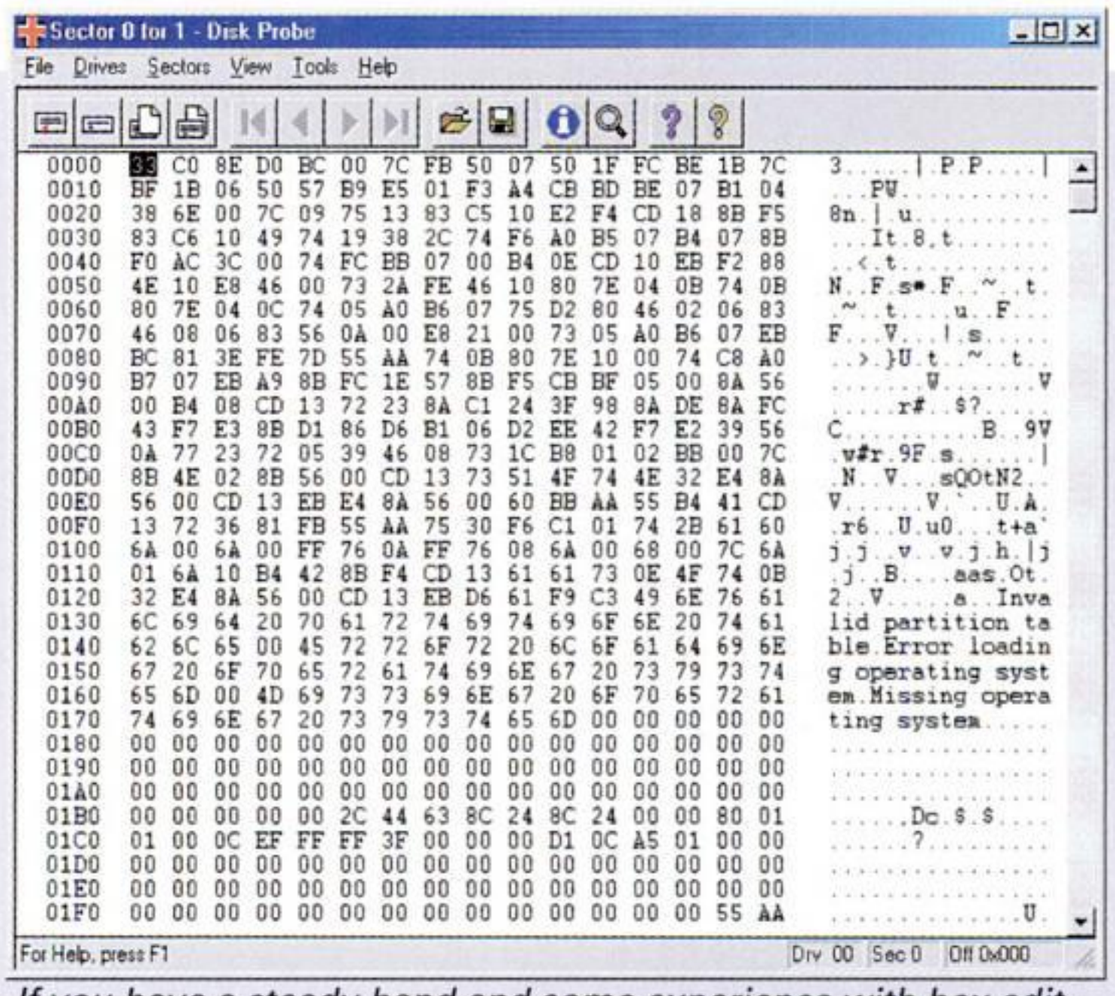
Microsoft includes a very powerful set of support tools located in the \Support\Tools folder on the XP Professional CD (these are unfortunately not included in the XP Home version). For descriptions of all the tools, Microsoft provides online documentation via release notes and a help file. Also, there's much more information on these tools in the Windows XP Resource kit, which you can view online at www.microsoft.com/windows/reskits/default.asp.

One of the more powerful and interesting programs included in the Windows Support Tools package is *DiskProbe*, a sector editor utility. *DiskProbe* allows you to read and write individual physical or logical sectors on a drive, and has special features for decoding and editing the Master Boot Record (MBR), partition tables, and volume or partition boot sectors. Because these structures are literally outside of the file system on a drive, they are not accessible through most other applications. With this tool, a knowledgeable user can restore these important data structures if they are damaged—say, by a boot-sector virus.

In addition to editing, you can also use *DiskProbe* for preventive maintenance, by making backups of these critical sectors as files, which can be stored on another disk (such as a floppy, for example). Once saved, they can be later restored in the event that these sectors are corrupted on your hard drive.

To run *DiskProbe*, first make sure you have installed the Windows Support Tools from the Windows XP Professional CD. Then select Start > Windows Support Tools > Command Prompt. At the prompt, enter **`Dskprobe`**. The program will then launch in a window. Optionally you can run the program by opening Windows Explorer and navigating to the \Program Files\Support Tools folder, then clicking Dskprobe. The documentation for the program is available via the Help command on the menu bar.

Note that editing critical sectors such as the MBR is like performing open-heart surgery on your system. *DiskProbe* and other sector editors like *Norton DiskEdit* function at a level below the Windows file system, which means that the standard safety protocols are not in effect. *DiskProbe* gives you access to every byte on the physical disk without regard to normal security or access privileges, which makes it possible to damage or overwrite critical areas of the disk. If you change so much as a single byte incorrectly, you could render your system non-bootable and possibly render the drive unrecognizable even if the system is booted from a floppy or CD!



If you have a steady hand and some experience with hex editing, DiskProbe *can rescue you from major hard-disk calamities.*

Fortunately, *DiskProbe* defaults to read-only mode, which means you can run the program to view sectors without worrying about accidentally making changes. Before you do make any changes with a low-level tool such as *DiskProbe*, make sure you have a backup of any important data.

I have specialized in data recovery for many years, and in that line of work I regularly use sector editors like *DiskProbe* to restore critical boot sectors on hard drives that had otherwise been inaccessible to Windows.

In a recent example, a client of mine appeared to have lost hundreds of hours of video footage due to a hard drive crash. To solve the problem, I did a manual inspection of the MBR and partition boot sectors. The drive had been formatted with the FAT32 file system, and I very quickly discovered that somehow the first sector of the three-sector long FAT32 partition boot sector, which was at Logical Block Address (LBA) 63, had been overwritten with zeros. I knew from experience that FAT32 keeps a backup copy of the primary partition boot sectors at LBAs 66 through 68. So I used *DiskProbe* to copy sector 66 and paste it to sector 63, thereby solving the problem.

A job like this would cost hundreds to possibly thousands of dollars if sent to a professional data recovery service. Now you see why most people who know data recovery don't like to teach it.

Except me, that is ■

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The Ultimate TROUBLE-SHOOTING GUIDE

Got PC problems? *Maximum PC* is here to help with answers to the 34 most common computer ailments!

BY THE *MAXIMUM PC* STAFF

#14 *Never, ever allow unattended toddlers anywhere near your PC.*

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GENERAL SYSTEM TROUBLESHOOTING

PROBLEM I have four pieces of RAM installed and I'm pretty sure that at least one is bad. What's the best way to test RAM for errors?

DIAGNOSIS Since you have four pieces of RAM, you can install just one DIMM in your mother-board at a time and run the machine until it crashes.

This isn't a completely reliable way to test RAM, though. As an alternative, try *Memtest86* (on the disc, www.memtest86.com) and create a bootable CD. *Memtest86* does a fair job. It runs several test patterns through the RAM. If a piece of RAM passes these tests, swap it with another DIMM and continue your tests.

Even better than *Memtest86* is Ultra-X's *RAM Stress Test Pro 2,* which is a self-booting diagnostic plug-in card. This card uses a comprehensive set of test patterns to assess your memory, and we've found that it finds bad pieces of RAM that other testers miss.

Keep in mind that it may not actually be a stick of RAM that's bad. The problem may in fact be a bad DIMM slot. If all four pieces of RAM pass the test, you may have to rerun them in each individual slot on your motherboard.

Finally, your motherboard's BIOS usually sets RAM timing by reading the SPD setting on the module. If the SPDs are set too aggressively (we've seen this), it may cause problems. You should consider going into the BIOS and manually tweaking settings such as your CAS latency to a more conservative setting.

Our cardinal rules of engagement regarding the troubleshooting of any PC problem can be succinctly stated:

1) Know the symptoms.

2) Isolate any and all variables

3) Double-check the obvious—like cable connections.

4) Diagnose the problem

5) Fix the problem.

If only it were as simple as this. PCs are complex creatures, and as such, fixing them is often an arduous, head-banging task that feels more like guesswork than an actual repair.

But with this said, we frequently receive the same questions about the same problems. Thus, we've bundled up answers to the most common questions. So let's dispense with the pleasantries and jump into the problem-solving ASAP, shall we?

PROBLEM My fan is whirring loudly. What's up with that?

DIAGNOSIS There are a few possible causes here. The most likely is that your system and fans are clogged with dust, which makes them less efficient. If this is the case, the fans have to work harder to keep up with the load. To fix it, clean your fans.

After you clean your fans, check the temperature around your PC. Some computers get louder as they get hotter because the fans spin faster to keep the system cool. You can fix this by cooling down the climate around your system or by adding fans that are quieter.

PROBLEM My PC spontaneously reboots.

DIAGNOSIS If rebooting occurs in a PC you just built, try reseating the CPU heatsink or making sure you used the proper thermal paste between the CPU and heatsink. Many times inadequate amounts of thermal paste that have been improperly applied, or low-quality thermal paste, can cause spontaneous rebooting as the CPU heats up.

You should also make sure you removed the plastic sticker from the bottom of the heatsink. As dumb as it sounds, it happens. While you're at it, make sure your heatsink is actually approved for your CPU. If, for example, you are trying to use the same all-aluminum heatsink that you bought for your Athlon XP 1600+ on your shiny new Athlon XP 3200+, you should consider a heatsink that's rated for the new CPU.

If your heatsink and thermal paste check out, it's likely the problem is caused by one of the following:

- **OVERCLOCKING:** This is kind of a no-brainer, but if you're overclocking any component, stop doing it or back it down to a "reasonable" level.
- **MEMORY TIMING:** This is also a likely cause of reboots. Dig into your BIOS and set your memory on Auto or at a more conservative setting and see if the reboot problem goes away.
- **OUTDATED BIOS:** Make sure you have the latest BIOS for your board. You can easily determine if your CPU is supported by browsing the BIOS updates of your motherboard vendor. If you are running a P4 Extreme Edition and you notice that it's supported only with the latest BIOS update on your board, this may be the culprit.
- **INADEQUATE POWER:** If you've recently performed a major component upgrade and changed everything on your PC except the power supply, your PSU may be overstressed or simply failing due to age or heat.
- **"FRANKENSTEIN SYNDROME":** Finally, hardware isn't always the cause of spontaneous reboots. If you have a Frankenstein (that's pronounced *Frankensteen*) installation of Windows XP that has moved from machine to machine, or has simply been in use for two or three years, it's time to perform a clean install.

PROBLEM Sometimes when I play games for a long time, my computer just randomly crashes to the desktop.

DIAGNOSIS Random crashes in games can be the result of a few different problems.

Typically, it's a heat issue, a driver issue, or a problem with the game.

The first thing you should do is check for a patch for any of your games that are crashing. It seems like common sense, but frequently we receive complaints from people trying to run games that have been patched three or four times. Once you've updated your games, you need to update your videocard and chipset drivers. Get your videocard driver from the company that manufactured your card's chipset, either ATI (www.ati.com) or nVidia (www.nvidia.com). You should also check for newer drivers for your motherboard's chipset whenever you update your videocard drivers. Outdated motherboard chipset drivers are one of the main causes of general system instability.

If you've updated all your hardware but are still having problems, you may have a heat issue. Open your case and look at your AGP card. Is there another card right below it? If there is, you should consider moving that card to another

#15 Never, ever allow your Dad to try to fix it.

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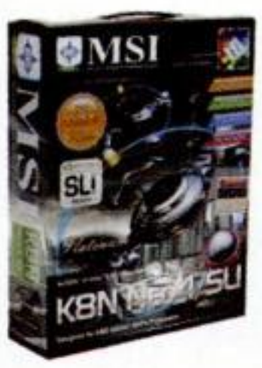

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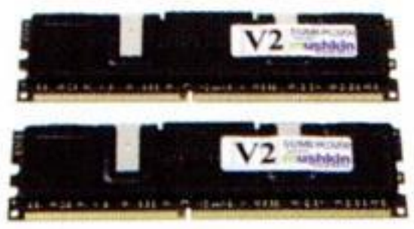

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Does your system crash frequently while you play games? It's likely that an overheated videocard is the cause.

slot. A card directly below a high-end videocard can disrupt airflow enough to cause overheating issues. If freeing the neighboring slot doesn't alleviate your problem, try adding a fan that fits into one of your PCI slots and exhausts hot air from the bottom of your PC.

PROBLEM My new Athlon XP system is telling me that my brand-new Athlon XP 3200+ is only an Athlon 2200+!

DIAGNOSIS It sounds like your motherboard's bus speed is set incorrectly. You see, you probably bought an Athlon XP 3200+ that runs on a 400MHz bus (which is actually a double-pumped 200MHz bus). For the motherboard to recognize the CPU as a 3200+, the CPU has to run at 2.2GHz, or 2,200MHz. The CPU reaches that speed only if the motherboard is set to an 11 multiplier and with a 200MHz bus. So, 11x200=2200. If your motherboard's frontside bus is set to run at 166MHz, the CPU would boot at 1833MHz. It's no coincidence that this is the same speed as an Athlon XP 2200+. To correct this, reboot your machine and go into the BIOS by hitting DEL or F2 during boot. Look for the section that lets you change the bus speed. Hopefully we're right and it's set for 166MHz. Increase it to 400MHz, save the settings, reboot, and you should have a 3200+.

PROBLEM My optical drive has suddenly slowed to a crawl reading discs, and it refuses to read some discs.

DIAGNOSIS Optical drives usually don't expire gradually; most simply stop working without so much as a death rattle. It's much more likely your drive's lens has accumulated a layer of dust.

Get yourself a can of compressed air at the local geek emporium, and eject the disc tray. Spray into the drive with quick, short bursts at an angle (so the dust is more likely to be expelled from the drive). Do *not* spray continuously or with the can upside down, because that could introduce moisture into the drive. Give the dust a minute to settle, and spray the innards again.

PROBLEM I just bought a new PC, and now my Pocket PC refuses to connect via the USB port.

DIAGNOSIS This is a common issue. You'll have to buy a new Pocket PC.

Just kidding. This problem occurs if you plug in your Pocket PC before installing ActiveSync. Check the Device Manager by right-clicking My Computer, selecting Properties, clicking the Hardware tab, and then selecting Device Manager. If you see an Unknown Device entry, delete it by right-clicking it and selecting Uninstall. Restart your PC, install your Pocket PC's drivers from the manufacturer's disc, and plug it in again.

#16 Don't even try to explain the issue/frustration to your significant other (see #11).

Hard-Drive Hassles

PROBLEM I just got a new Serial ATA hard drive, but when I try to load the image of my current drive onto it, the drive-imaging software doesn't recognize my new hard drive.

DIAGNOSIS This is a problem that has vexed us as well, and it comes down to the fact that most drive-imaging software programs don't recognize Serial ATA controllers and therefore won't let you image the drives connected to it. We've tested practically every imaging program on the market in the Lab, and the only one that successfully moved an image to a SATA drive and made it bootable was Symantec's (formerly Powerquest) *Drive Image 2002*.

PROBLEM I just plugged in a brand-new hard drive but it's not showing up in Windows XP.

DIAGNOSIS All brand-new hard drives are sold unformatted and thus don't show up in Windows until they've gone through the formatting process. To get up and running, connect the drive, boot your PC, and at the Windows desktop right-click the My Computer icon and select Manage. Click Disk Management in the left-hand tree, and every drive connected to your system will show up. Simply right-click your new drive and select New Partition. Then follow the steps to get your drive up and running.

PROBLEM My system crashed, and when I rebooted, my RAID array was no longer working properly.

DIAGNOSIS RAID arrays can stop functioning for several reasons, but it's usually a case of a cable coming loose or something in the BIOS being reset. Serial ATA cables easily come out of their drives, so check them first. If everything is connected properly, you should also check to make sure that the ports your array is plugged into are set to "RAID" rather than "IDE." Because these ports often double as either standard IDE ports or RAID ports, they must be set in the BIOS to one or the other. Be sure to check here first if your array suddenly disappears.

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If your MP3 player keeps crashing, an improperly encoded song is probably the cause.

PC AUDIO AND MP3S

PROBLEM I'm getting sound out of only one speaker.

DIAGNOSIS This usually happens when the mini-jack coming out of your speakers is not fully plugged into the soundcard input slot. Reversed polarity of a speaker can cause some weirdness as well, so make sure the positive terminal on the actual speaker is connected to the positive terminal on the subwoofer (or wherever the speakers connect to the amplifier), and vice versa for the negative terminals. One final possibility: Pet owners should routinely check speaker cables for teeth marks and replace the cables when Mr. Bigglesworth eats through the outer layer.

PROBLEM The remote control for my PC speakers suddenly stopped working the other day. I installed new batteries but it still won't work. Is it dead?

DIAGNOSIS Probably not. It sounds more like a sleeping remote. To wake it up, simply remove the batteries and press every button on the remote in a sequential order. Then just replace the batteries and your remote should work again.

PROBLEM Sometimes I'll rip a worn CD, only to find later that some tracks have skips in them.

DIAGNOSIS This is a common problem, and can be easily fixed. Go to **www.exactaudiocopy.de** (don't worry—the site is in English). We've brayed about *Exact Audio Copy* before, and here's why: When *Exact Audio Copy* rips audio, it double-checks the data for accuracy, and if it detects any discrepancies between the original and the rip, it will extract the data again and again until it has determined that the result precisely matches what's on the disc. If the error correction is unable to compensate for a flaw in the disc and the data is irretrievable, *Exact Audio Copy* will let you know, sparing you from unpleasant surprises later. Oh, and did we mention *Exact Audio Copy* is free? Life is good.

PROBLEM My Creative Labs Jukebox Zen Xtra keeps crashing. Is it broken?

DIAGNOSIS If a single bit in an MP3 file is out of place or errant for any reason, it can make many MP3 players lock up or crash. You'll know this is the case if your player crashes on the same track every time. If so, you'll have to remove or re-encode the track.

If an errant track is not the problem—you'll know this is the case because it won't crash on the same song(s)—you may be able to rehabilitate your player by reformatting the drive. You'll find instructions at the Creative Labs web site. Go to Support, click Portable Audio, and select "Troubleshooting the Nomad Jukebox 3 as a Standalone Unit" (also known as Solution ID #7392). Reformatting will delete the contents of your player, of course, so make sure you have all your music backed up before you go for it.

PROBLEM I can burn audio CDs and listen to them on my PC, but my portable CD player and car stereo can't recognize them.

DIAGNOSIS Commercial CDs are literally stamped from extruded masters, creating pits and lands that CD players have been designed to read. Burned CDs, however, create darkened areas that mimic the pits and lands of commercial CDs. As you've noticed, not all players—especially older ones—can deal with these kinds of discs. But all is not lost. Your best bet is to burn at a slower speed, 4x or below. This creates slightly more prominent differences between the burned and non-burned areas.

If you have a Plextor burner, though, you have an even better option. The bundled *PlexTools* includes *VariRec*, which allows you to subtly alter the burning strength of your optical drive's laser. By experimenting with various discs and burning strengths, you will almost certainly find the right combination for your CD player. *VariRec* is supported by both *Nero* and *Easy CD Creator*. We've used it to make audio CDs playable on otherwise uncooperative boom boxes.

PC-Building Woes

PROBLEM I just built a new machine and am experiencing totally random crashes. What are the possible culprits?

DIAGNOSIS Random crashes are always hard to diagnose, so let's cover all the bases. The first area to check is your drivers. Make sure you have the latest drivers for all your hardware, especially the motherboard chipset drivers. You should also make sure you've downloaded all Windows Updates.

Next, consider your power supply. If you're running a midsize 300-watt PSU and upgraded to a late-model Pentium 4 CPU or Athlon FX, or are just running several hard drives and PCI add-in cards, you should upgrade your power supply to a 400-watt-or-thereabouts model. Inadequate power to your components can cause the entire system to lock up at worst, or just cause certain components to malfunction or stop working.

The final consideration is cooling. Ideally, you should have a decent-size fan in the lower front of your case sucking in cool air from outside, and a large exhaust fan above your AGP card to pull air out of the case.

PROBLEM I'm building a new PC and have the motherboard mounted inside the case. When I push the AGP card all the way down in the slot, the end of the metal tab on the slot cover hits the bottom of the case, preventing me from inserting the AGP edge connector all the way.

DIAGNOSIS Even though every ATX motherboard and ATX case should be exactly the same dimensions, there are still small variances that can create problems when transplanting your hardware into a new environment. It's fairly common for the videocard to not quite fit, and when this happens the solution is to simply bend the end of the metal slot cover away from the board ever so slightly. This will afford it the extra millimeter or so of clearance the card needs to fit all the way down into the slot. But be careful!

Like Kenny Rogers croons: "You gotta know when to walk away."

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WI-FI NETWORKING

PROBLEM My wireless laptop will not connect to my wireless router. It can't even see it!

DIAGNOSIS Usually Wi-Fi connection problems are the result of configuration errors, incompatible firmware, or interference with another router.

It's easy to fix firmware issues—all you need to do is download the latest firmware from your wireless router manufacturer's web site. If you've installed the firmware update and still can't connect, your next step is to temporarily disable WEP or WPA. If you can connect to the router when security is disabled, check all your WEP settings. You need to use exactly the same key on your router and any machines that connect to it wirelessly. Also make sure the Authentication Type on each of the PCs matches the setting on the router.

Troubleshooting interference issues is more complex. First, you should move your router off of the default channel. Most routers shipped today are set at channel 6 by default, and the sheer traffic can create a lot of interference. You should also uncheck the field that says, "Automatically connect to non-preferred networks"—there is no advantage to the feature and it can cause your computer to behave erratically if you're in the proximity of other networks.

If you're still having problems connecting, there may be a hardware problem on your laptop. Check Device Manager and make sure there isn't an exclamation point beside your Wi-Fi card. You should also try connecting to another router that you know works properly. Finally, try connecting to your network using the same settings, but a different brand of Wi-Fi card.

If all else fails, contact your router manufacturer's tech support line. You may actually have a faulty router.

PROBLEM My broadband connection feels like it's downloading really slow.

DIAGNOSIS Sadly, there isn't much you can do to improve your broadband connection's performance without spending more money to upgrade your existing service. Sure, there are a whole lot of products that claim to "improve your broadband speed," but we don't know of anything that actually works.

If your performance is significantly slower than the advertised claims of your provider, you should complain to your ISP. For services advertised as full-speed, we expect a minimum of 50kB/s download speeds and prefer to see our speeds top out over 100kB/s. If you are paying for a high-speed broadband connection but are seeing less than 50kB/s downloads, you should switch ISPs!

PROBLEM My wireless laptop keeps "detecting" wireless networks in my house. Every time it does this, it drops my existing connection until I reconnect. How can I prevent this from happening?

DIAGNOSIS Nearly everyone on the *Maximum PC* staff has experienced this problem at one time or another, and we've had varying levels of success fixing it.

The first thing you should do is open the Properties page for your Wi-Fi card, go to the Wireless Network tab, and click Advanced. Uncheck "Automatically connect to non-preferred networks." This will prevent your machine from automatically connecting to your neighbors' networks.

If your router is configured in a stealth mode so as not to broadcast your SSID,

Disabling the Wireless Zero configuration service can stop your wireless connection from dropping randomly. Unfortunately, disabling the service will also stop your PC from automatically configuring Wi-Fi access when it "sees" new access points.

this can sometimes confuse Windows's built-in Wi-Fi configuration tool. We recommend disabling any options that prevent your router from broadcasting your SSID.

If that doesn't fix your problem, wait until your machine is connected successfully, then go back to your Wi-Fi card's Properties pages and uncheck "Use Windows to configure my wireless network settings" at the top of the tab. After that you should also go to Start, Control Panel, Administrative Tools, Services, and disable the Wireless Zero Configuration service. That will prevent Windows from automatically switching your machine to unwanted wireless networks, but it will also prevent you from connecting to any other Wi-Fi LANs—like the ones at Starbucks or your office.

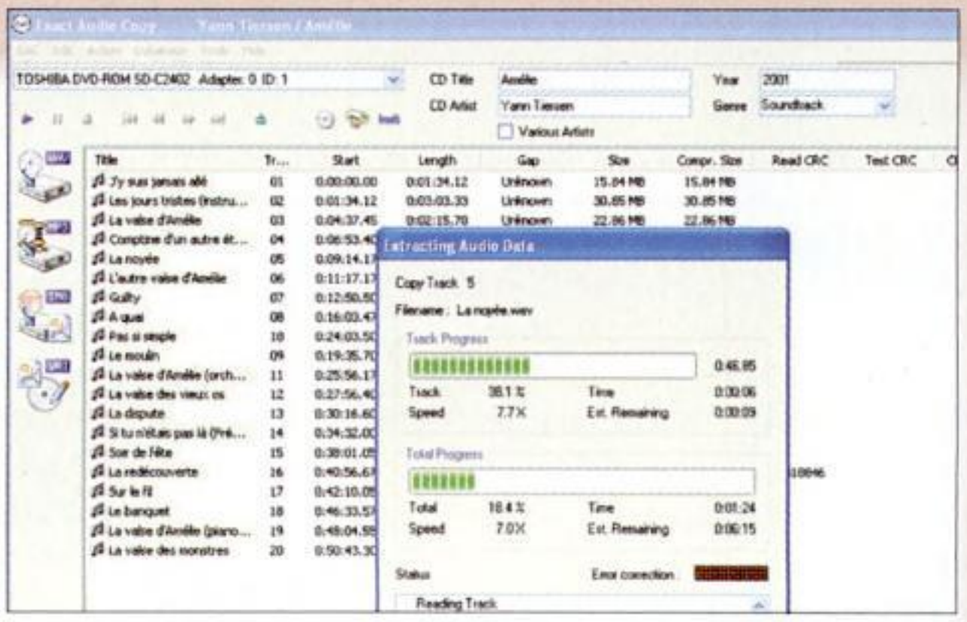
If you have a sure-fire, works-every-time solution to fix this wireless networking problem, we want to hear it! Send it to input@maximumpc.com.

MP3 Madness

PROBLEM I can't rip songs into the MP3 format using Windows Media Player.

DIAGNOSIS You'll have to purchase a plug-in that enables MP3 ripping. You can find these plug-ins at **www.microsoft.com/windows/windowsmedia/9Series/GettingStarted/Personalization/Plugins.asp.**

But why bother? Just download *iTunes* with its free MP3 encoder, or try *Exact Audio Copy* and the superior LAME MP3 encoder. Both are free, and they're on the disc that came with this issue. Give 'em a whirl, you'll be glad you did.



Experiencing problems with your ripped songs? Try using *Exact Audio Copy*—it flawlessly rips songs. And it's free!

#18 Don't be afraid to enlist professional help, open a manual, or (gasp!) ask for directions.

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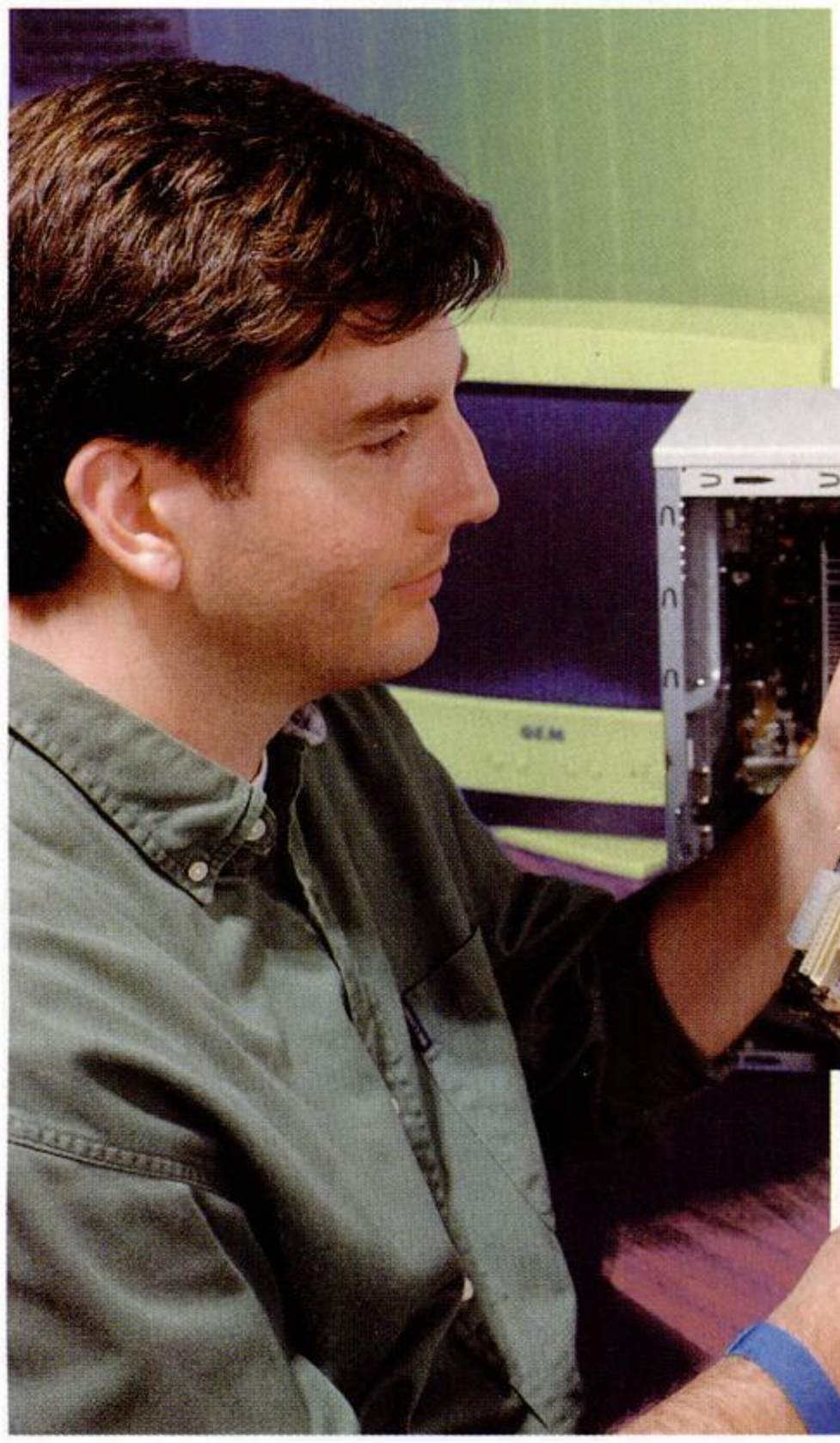

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* Source: U.S. Department of Labor *Occupational Outlook Handbook.*

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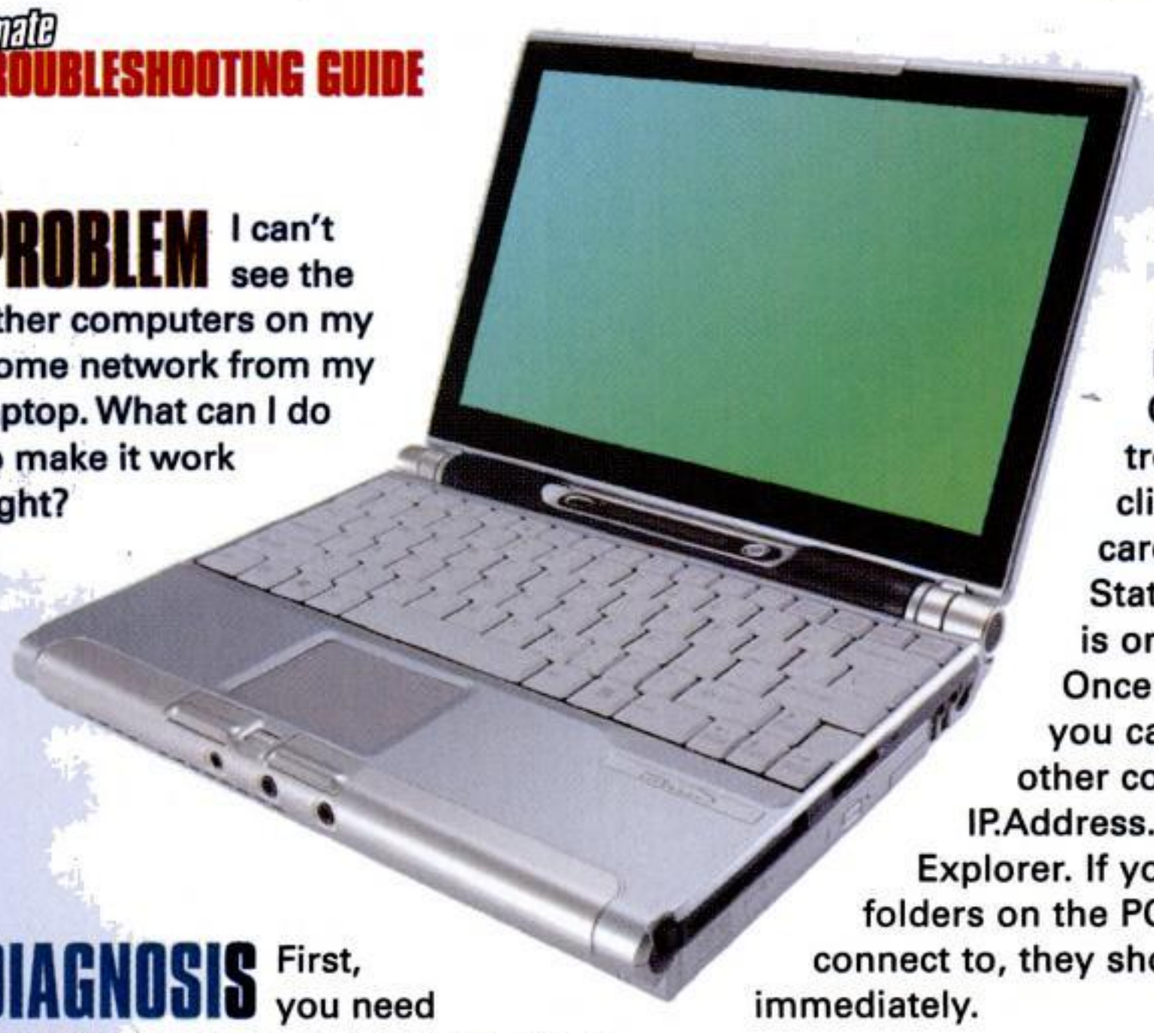

PROBLEM I can't see the other computers on my home network from my laptop. What can I do to make it work right?

DIAGNOSIS First, you need to make sure that each computer you want to connect to belongs to the same workgroup. Open the Start Menu and right-click My Computer. Go to Properties, then Computer Name. If your workgroup name doesn't match, you can change it by clicking the Change button. Some versions of Windows only show the computers that actually have shared folders or printers, so make sure you have at least one folder shared on every computer you're trying to connect to.

The next step is to disable your firewall. By default, most firewalls block the ports used by Windows networking, keeping even legitimate users—like you—from connecting to your machine.

If all your machines use the same workgroup and your firewalls are disabled, and you're using a wireless router, your problem could be the router. If your wired machines can all see each other and your wireless machines can see each other, but a wired machine can't see a wireless machine, it's almost certainly the router's fault. Barring a firmware update that fixes the problem, there's no easy way to connect your machines if this is the case. Check with your router manufacturer for a newer version of the firmware. If that doesn't work, you may need to get newer hardware.

Here's one last tip: You can try to connect to your computer's specific IP address instead of its name. To find the IP address, go to the Network Connections control panel, right-click your network card, and select Status. The IP address is on the Support tab. Once you have the IP, you can go back to your other computer and put // IP.Address.here/ into Explorer. If you have shared folders on the PC you're trying to connect to, they should pop up immediately.

PROBLEM My PC shows a strong signal, but I can't connect to the Internet.

DIAGNOSIS Three or four factors can cause a connection with no data transfer. First, try upgrading your access point's firmware. We've spent hours trying to configure and re-configure a dead Internet connection, only to discover that a firmware update was all we needed. (The firmware is like your access point's operating system.)

If that doesn't work, check for a misconfigured WEP (wired equivalent privacy) or WPA (Wi-Fi protected access) key. If you have other wireless PCs that are operating properly on your network, re-enter your WEP or WPA key on the machine that's not working.

If you live in an apartment complex with several other wireless access points, you may need to prevent your PC from connecting to other APs. Go to Start, Control Panel, Network Connections, then right-click your wireless network card and choose Properties. Go to the Wireless Network tab, then click the Advanced button and ensure that "Automatically connect to non-preferred networks" is not checked.

The final potential pitfall is an IP address misconfiguration. Go back to the Network Connections Control Panel, right-click your wireless network card, and then select Status. Go to the Support tab and check the IP address. For most IP addresses, the address type should be listed as "Assigned by DHCP." If that field lists "Auto-configuration IP address," it's easy to fix: Just press the Repair button to get a current dynamic address.

If the address-type field says "Static IP address," you'll probably need to change it to dynamic. First click Network Connections, and press Properties. Click the General tab, then double-click the Internet Protocol item. Make sure that "Obtain an IP address automatically" and "Obtain DNS server address automatically" are checked.

PROBLEM My access point is on and configured, but my wireless computer says there's no available wireless network.

DIAGNOSIS First, try moving your computer closer to your access point. If you're sitting three feet away from the AP and don't have a connection, either your device or the AP is misconfigured. Make sure your access point and PC are using the same type of security, either WPA or WEP. You also need to ensure that the security key is the same on the AP and the PC.

Make sure your card and access point are using the same spec. While 802.11g is backward-compatible with 802.11b, some access points allow the user to lock the AP into 802.11g-only mode, preventing connections from older 802.11b hardware.

If you've checked the security and compatibility settings, but still have no connection, check your AP manufacturer's web site for a firmware update. Many times, incompatibility issues between access points and wireless networking cards can be quickly resolved with firmware updates.

PROBLEM I've tried everything above, but I still can't connect to the Internet.

IN THE LAB: HOW TO TEST WI-FI PERFORMANCE

We use several benchmarks to test Wi-Fi performance, but the simplest method is to measure the length of time it takes to move a large file from a wired machine to a wireless machine and then back again. We use an FTP server for our tests, but it's entirely acceptable for a home user to just use Windows file-sharing by dragging and dropping files between directories. To test performance, you'll need a stopwatch and a file larger than 200MB. When the file is finished transferring, divide the size of the file by the length of time it took to download. We generally find that 802.11g networks transfer at about 1.2MB/sec, or about 10Mb/sec, from a wired to wireless network in a best-case scenario.

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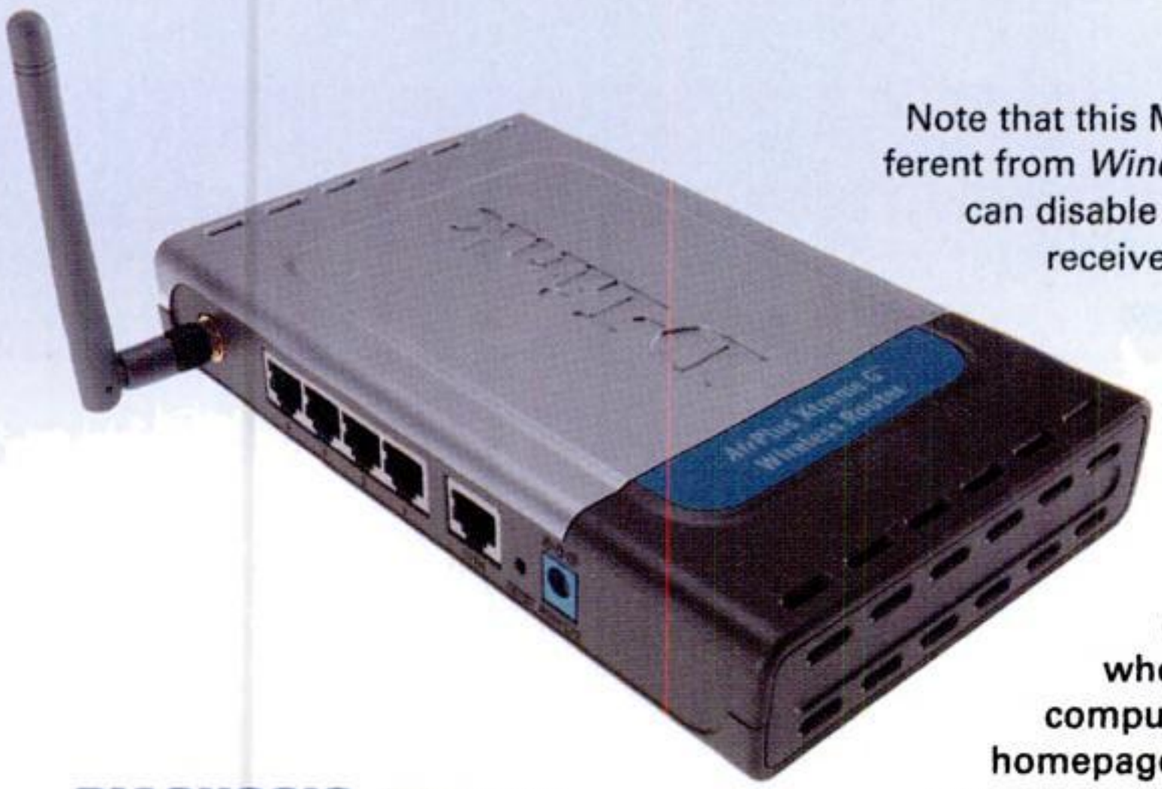

DIAGNOSIS Either your Internet connection is down, or your router isn't talking to the Internet via your Internet Service Provider. If your access point is built into a router, make sure the router is actually working by plugging a PC into one of the wired Ethernet ports. If you can't connect using the wired port, then your router may be misconfigured. Make sure your router is configured as your ISP recommends. Check the IP address and your PPPoE settings. Some ISPs used to tie your connection to a single MAC (media access control) address, but that's increasingly rare. If you're concerned that there's some ISP funny business going on, check your access point's documentation to see how to clone your desktop PC's MAC address onto your router.

If it still doesn't work, try connecting your PC directly to your DSL or cable modem. If you can connect to the Internet when plugged directly into your modem, then your router is misconfigured. If you can't, contact your ISP to get your broadband connection working properly.

WINDOWS XP

PROBLEM My computer is acting odd. Loads of windows open all the time, and I'm getting a bunch of popup windows that don't look like *Internet Explorer* windows.

DIAGNOSIS Your problem is most likely caused by incoming Messenger service messages. In a networked corporate environment, Messenger is used to send time-sensitive messages about server outages and software updates, but there's really no reason to leave Messenger running at home. To disable it, go to Start, Control Panel, Administrative Tools, and then Services. Scroll down to Messenger, right-click it, and select Properties. Change the Startup Type to Disabled and then press OK.

Note that this Messenger service is different from *Windows Messenger*. You can disable this service and still receive instant messages!

PROBLEM A couple days ago, my computer began behaving very oddly. The disk runs a lot, even when I'm not using the computer, and my browser homepage is reset to a site I've never been to before.

DIAGNOSIS This sounds like a classic case of spyware infection. There are two apps we recommend for combating spyware: *Spybot Search & Destroy* and *Ad-Aware*. Both applications are on the CD, and both scan your hard drive for potential spyware and will help you remove it if detected. We recommend using both apps, because sometimes one application will detect a new spyware program that the other won't.

If one of the applications detects spyware on your PC, it will either automatically remove it, or give you instructions that allow you to remove it.

PROBLEM My e-mail frequently stops working—it often stalls when receiving and sending. And no matter how many times I change the e-mail settings, it reverts to "localhost."

DIAGNOSIS There's an outside chance the problem could be a virus, but the most likely culprit is your antivirus program or your spam-filtering program. These apps work by situating themselves between your mail program and your e-mail server, then taking a look at every piece of mail you receive. But if one of those programs crashes or needs input from you, it will hold up the e-mail download and your mail program will think the connection has died. If this happens, just restart your antivirus program and spam filtering program and try downloading messages again.

PROBLEM I keep losing menu options in Microsoft *Word*.

DIAGNOSIS Our bet is that you really like to use em-dashes. The default keyboard shortcut for an em-dash is Ctrl+Alt+the numpad Dash, but people often mistakenly press Ctrl+Alt+ the Dash on the primary keyboard, which is the default keyboard shortcut for "Remove item from the menu." After you call up that shortcut, your cursor will change to a bold minus sign and the next menu or shortcut you click will disappear from *Word*.

The solution? Don't use so many em-dashes! Alternately, you can remap the em-dash shortcut to something a little more convenient. Go to Tools, Customize, Commands, and click the Keyboard button. Then, under Categories, scroll down to Common Symbols and click Em-dash in the right pane. Change the hotkey to whatever you'd like. We like Ctrl+M.

To get back the menu items that you've lost, go to Tools, Customize, Commands, and drag the elusive commands back into place.

PROBLEM I keep accidentally e-mailing my friend at her old address because the program created a shortcut for me.

DIAGNOSIS This is an easy fix. When you're typing the name into your To: field, scroll up and down until you get to the one you want to delete. When it's highlighted press the Delete key and it will be gone forever!

PROBLEM I get a ton of spam every day.

DIAGNOSIS There are a couple really good, free anti-spam utilities available today—*SpamPal* (on the disc, www.spampal.org) and *Popfile* (popfile.sourceforge.net). They use slightly different approaches, but each can reduce your spam intake by up to 99 percent. SpamPal analyzes every e-mail you receive and compares the path it took across the Internet with the servers and IP addresses of known spammers. It's very effective right out of the box, but if you frequently receive e-mail from countries where spam is known to originate, such as China, Russia, and Taiwan, or from webmail services like Yahoo, which are frequently abused by spammers, you may see a lot of false positives.

On the other hand, *Popfile* uses a technique called Bayesian filtering to determine which letters are spam based on the content of your e-mails. Every time you mark a message as spam, the contents of the message are added to the database. This is highly effective once the filters are fully trained, but it can take several weeks of flagging each incoming message as spam before you start seeing greater than 90 percent accuracy. ■

#20 Do not attempt to sleep until your PC is fixed, or at least diagnosed. It's useless.

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WINDOWS XP: THE RIGHT WAY

ILLUSTRATION BY GIACOMO MARCHESI

Lab-tested and *Maximum PC*–approved, the ultimate four-point plan for eternal Windows bliss

You may have grown up in Mayberry, where everyday life was simple; where nobody locked any doors and good Samaritans returned your wallet with the contents intact. But when you moved to the big city, life got a lot more complicated. You had to figure out all of life's cruel angles, and eventually you learned that your apartment needed not only locks, but also an alarm system, and a snarling Rottweiler to keep watch. You learned to look over your shoulder and avoid dark alleys, and at some point you may even have considered some form of non-lethal self-defense.

And so it is with today's PCs. There are more obtuse configuration options in Windows XP than there were in Win95, Win98, and Win2000, and each option can have a profound effect on how efficiently your rig operates. And once you're online, your PC will be under constant attack from a rogue's gallery of virtual threats, including virus infections, Trojans, and worms. Such are the twin Achilles' heels of WinXP: Because it's so damned popular, it's become an irresistible attraction to the ne'er-do-wells who write spyware, and because it's so damned complicated, the world's wretched code monkeys have ample opportunity for exploitation.

The upshot is that preventive measures have become absolutely essential to every Windows PC user. After you do an initial operating system overhaul, you need to practice continued vigilance to protect yourself against malware, and frivolous utilities. The benefit of regular OS maintenance is that you'll likely find yourself having to do less and less troubleshooting down the road–you'll have fewer problems with your PC.

In this step-by-step guide, we'll show you how to flush your PC of all the crud—including performing a clean installation if necessary—and how to keep it tuned to perfection until Windows Longhorn arrives. In fact, this may be the last Windows XP guide you'll ever need before it's time to switch to the next-generation OS.

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ATTENTION!

As with all *Maximum PC* how-to articles, make sure you read the entire article before proceeding with the actual project.

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Installing WinXP—the Right Way

Proper overhaul procedures for PCs exhibiting an almost Mickey Rourke–level of petulance and bugginess

In the bad-old days, when we were all stuck using Win9x-based operating systems, reinstalling Windows was an annual chore. Windows XP changed that. With WinXP, reformatting has become a blessedly rare occurrence, usually occasioned by a big hardware upgrade. However, over the last 18 months, we've seen an alarming increase in all forms of "malware"—from traditional viruses and worms to new-age spyware and Trojans. And frequently, the *only* way to remove the infection is to raze Windows and start over.

In the case of malware, the old proverb "an ounce of prevention is worth a pound of cure" holds true: it's infinitely easier to prevent infections on your computer than to deal with the mess they leave behind. In this section, we're going to show you how to install Windows from scratch and protect it while it's at its most vulnerable, and teach you how to avoid trouble so you won't become infected down the line.

Needless to say, starting with a fresh install of Windows is a drastic step. If your machine hasn't exhibited any of the common signs of spyware infection (check the "6 Signs" sidebar on this page), then you might not need to wipe your current WinXP install just yet. Instead, skip ahead to our preventive medicine advice on page 40.

If, on the other hand, your machine is more infected than a pack of runny-nosed first graders, keep reading.

THINGS YOU'LL NEED BEFORE INSTALLING WINXP

- A blank hard drive (duh)
- Windows XP CD (uh, *yeah*)
- WinXP Service Pack 2
- Drivers for all your hardware
- A floppy drive (if you want to install on a RAID array or Serial ATA drive)
- Any info you'll need to connect to the Internet (e.g., PPPoE login or static IP address)
- Firewall software (we like the free version of *ZoneAlarm*)

Once you've collected everything in this list, you can get started installing Windows.

FIRST, DO A BACKUP

The safest and easiest way to cleanly install Windows is to put it on a newly purchased, virgin hard drive (see hardware installation instructions on the next page). Then, after you've patched this fresh WinXP installation with Microsoft's latest updates, and installed antivirus and anti-spyware apps, you can safely copy your treasured personal documents from your original (and possibly infected) hard drive to the new drive. New drives cost as little as $1 per gigabyte, so we recommend the buy-a-new-drive approach. However, if you decide to reformat your current drive, and then install WinXP on it, you'll need to back up all your important data and documents, including (but not limited to) the following:

- E-mail
- Personal files
- Bookmarks
- Software serial numbers
- MP3, AVI, and other media files
- Saved games
- Billet-doux

WARNING!
Reinstalling Windows will wipe all data from the operating system partition, so back up all your precious data and documents!

Seems easier to simply shell out for a new drive than to back up all that stuff, doesn't it? Once you've purchased your new hard drive, you'll need to collect a few key ingredients. We've put a handy-dandy checklist of all the stuff you'll need in the sidebar to the left. Of special note is Windows XP Service Pack 2, which should be downloaded from **www.microsoft.com/downloads** before you start your basic OS installation. Why do this beforehand? Because if you connect an unpatched, unfirewalled computer to the Internet long enough to download the latest Microsoft updates, your machine *will* be infected.

6 SIGNS YOUR MACHINE IS INFECTED

- You're deluged with pop-up ads.
- Your web browser defaults to a page you never requested, as if possessed by a demon.
- Media files open in strange applications.
- Your machine takes a long time to do anything—boot, open apps, shut down, etc.).
- You suffer frequent, unexplainable slowdowns.
- Your computer just starts acting plain whacked!

INSTALLING WINDOWS XP

Whether you're new to WinXP or install it thrice a week just for kicks, we want to impress upon you a few *Maximum PC*–certified tips that should make your installation easier. First, you should unplug your network cable during this phase of the project because WinXP is at its most vulnerable right after it's installed (before your firewall is online and any patches are applied).

Second, shut down the PC, install your new hard drive, disconnect your old drive, and reboot the machine. (If you're installing Windows on a Serial ATA hard drive or any kind of RAID array, this is a good time to make sure you have a working floppy drive connected to your system. You'll need a floppy drive to install the drivers that will let Windows see your hard drive.) Third, it's a good idea to disconnect any USB or FireWire drives you might have (even memory card readers should be disconnected). These drives can confuse the WinXP installer, and might prevent you from installing the OS on the drive letter you prefer.

After following the above tips, put your WinXP CD in your optical drive, and reboot the machine. After the BIOS screen pops up, you should see a prompt that says "Press any key to boot from CD...." Now press a key and the Windows installer will start. If you don't see the prompt to boot from the CD, you need to ensure that your optical drive is listed before your hard drive in your BIOS's boot order. Consult your mobo manual for the full scoop on adjusting your boot order. If you're installing drivers for your RAID or SATA

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WINXP DOs & DON'Ts

DON'T be afraid to reinstall Windows! It's not hard, especially if you install onto a blank hard drive instead of wiping your existing drive.

DO install your F6 SATA drivers instead of the ones built into Windows. You won't be able to take advantage of advanced features without them.

DO use a slipstreamed Windows XP install disc with the latest Service Pack built in. (Check www.maximumpc.com/how-to/howtoindex.html for full details on creating your own slipstreamed WinXP install disc.)

DO collect drivers for all of your software and burn them to CD or DVD before you format your hard drive.

DO disconnect your old hard drive before you install Windows. You don't want to accidentally erase all your files!

DON'T copy data or files from your old hard drive until your new machine is protected.

DON'T waste a bunch of time trying to repair a hopelessly infected Windows install. It can take more time to clean off the infected files than to back up your data and reinstall Windows.

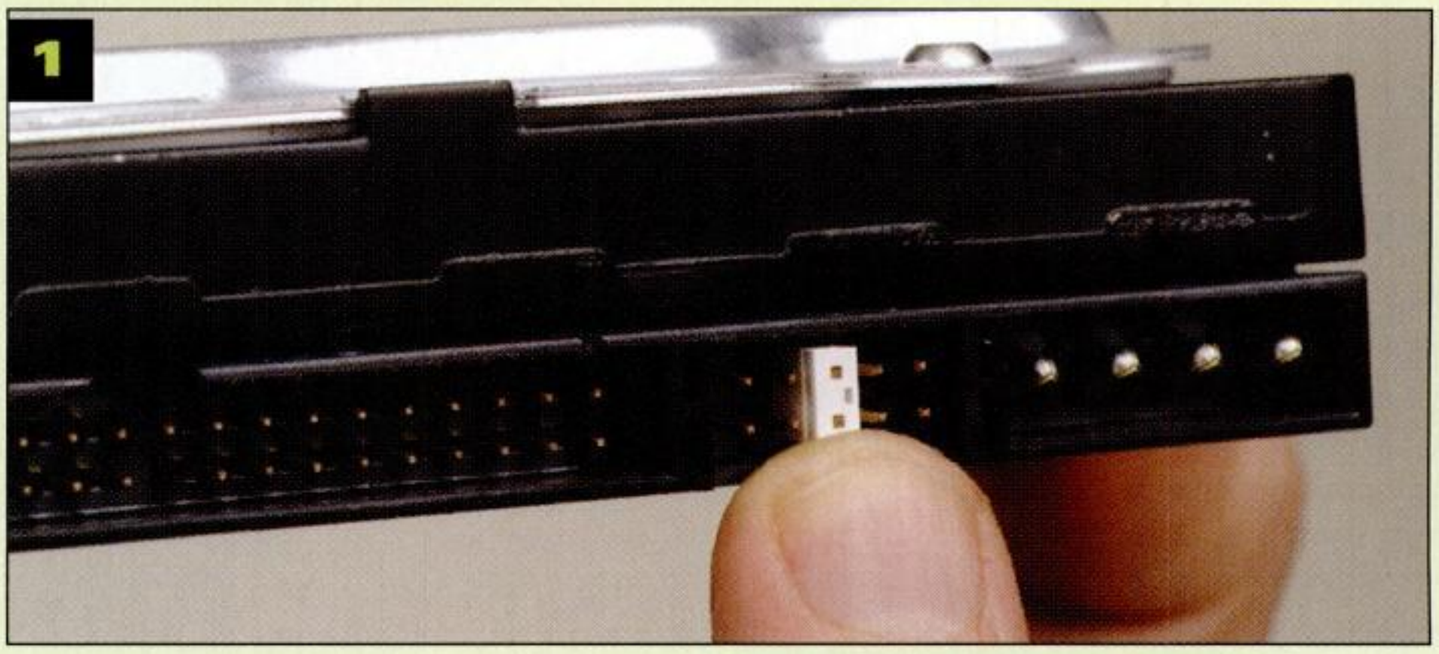
DON'T connect your computer to the Internet until you have a firewall installed and configured.

drives, watch the bottom of the screen immediately after it turns blue for the "Press F6 to install a third-party SCSI or RAID driver..." prompt. Pressing F6 has no immediate effect, but it will give you the option to load drivers at the appropriate time.

From this point on, the Windows installer should guide you through the install process.

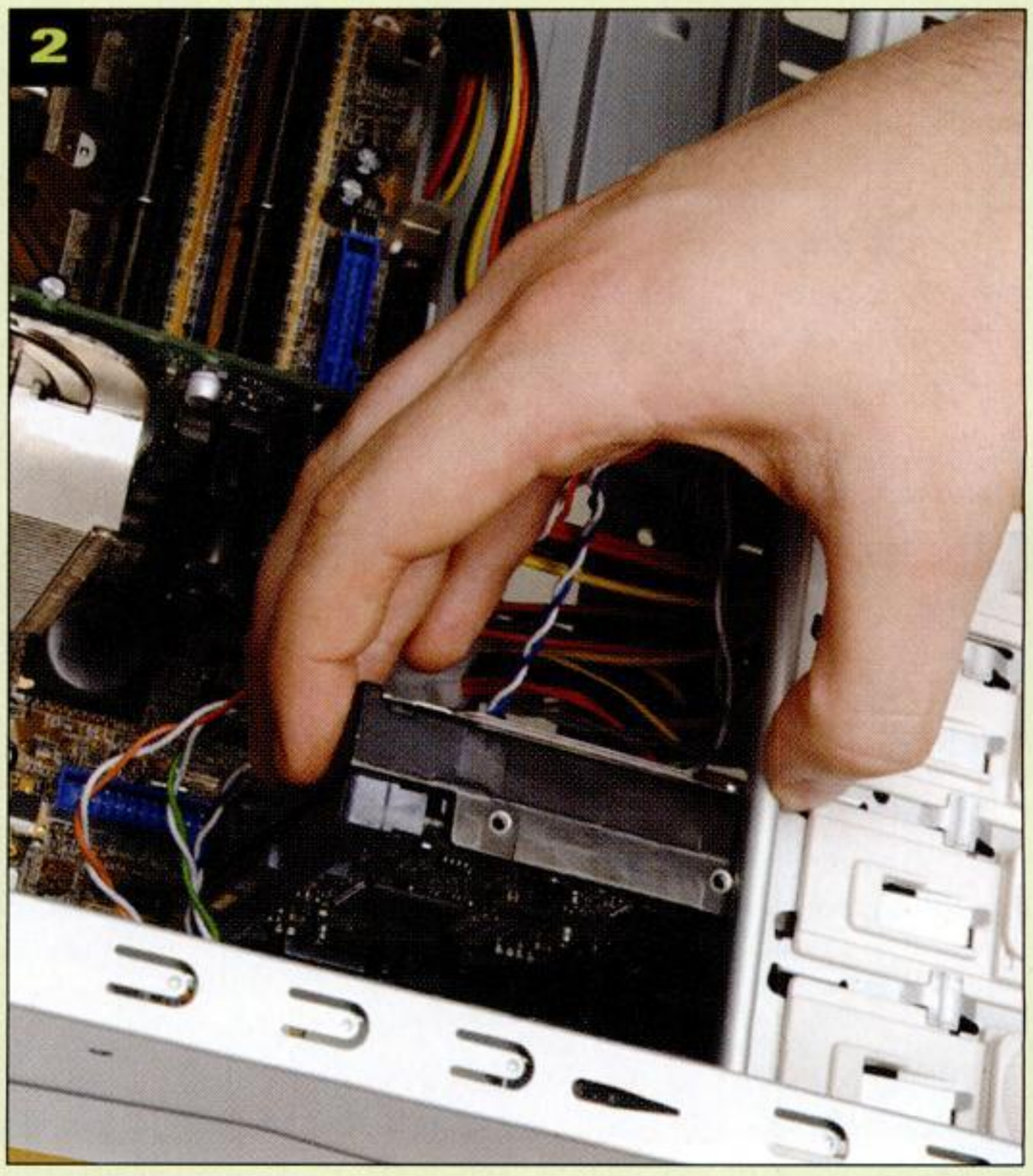
Install a hard drive in 3 easy steps

Installing a new hard drive is as easy as opening your case, setting your drive's jumpers, and plugging in a couple of cables. But before you install a new hard drive—and disconnect the old one—make sure you've collected all the data and downloaded all the drivers you'll need for the rest of this how-to project.



STEP 1: Prep the drive. Every parallel ATA drive sports a physical "jumper" plug that controls the drive's master/slave status (there can be only one master and one slave device on each parallel ATA channel). We recommend you set your new drive to the master setting and your old drive to the slave setting. (SATA drives don't have master and slave settings, so SATA owners can ignore this step.)

STEP 2: Install the drive. Find an empty 3.5-inch drive bay (typically near the front of the case at the bottom), and slide the drive into the bay. Make sure the cable connectors are where you can get at them. Mount the drive in place with four screws or your case's brackets.



STEP 3: Get connected. Now attach the parallel ATA cable from your motherboard to the new hard drive, and attach the power cable from your power supply to your drive. Until you're ready to copy your personal documents from your old drive to your new drive, you should leave the old hard drive disconnected so you can't accidentally wipe it.

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Configuring Windows—the Right Way

It's sort of like sending your operating system to military school before the counterculture can corrupt its mind

After Windows XP finishes installing itself, it's crucial you begin protecting your system posthaste—i.e., *before* you put your PC online, where, inevitably, it will be exposed to corrupting influences. This means you'll need to postpone activating Windows until after you've installed Service Pack 2 and activated the firewall—unless you want to go through the hassle of activating Windows XP over the phone.

If you have a copy of Service Pack 2 saved someplace—on a USB thumb drive or a CD-ROM—it's easy to install. Just click the executable file, and follow the instructions at the prompt. Service Pack 2 enables WinXP's firewall from the get-go. Once the firewall is installed and enabled, you can reconnect your machine to the network and activate Windows.

IT TAKES ONLY 4 MINUTES

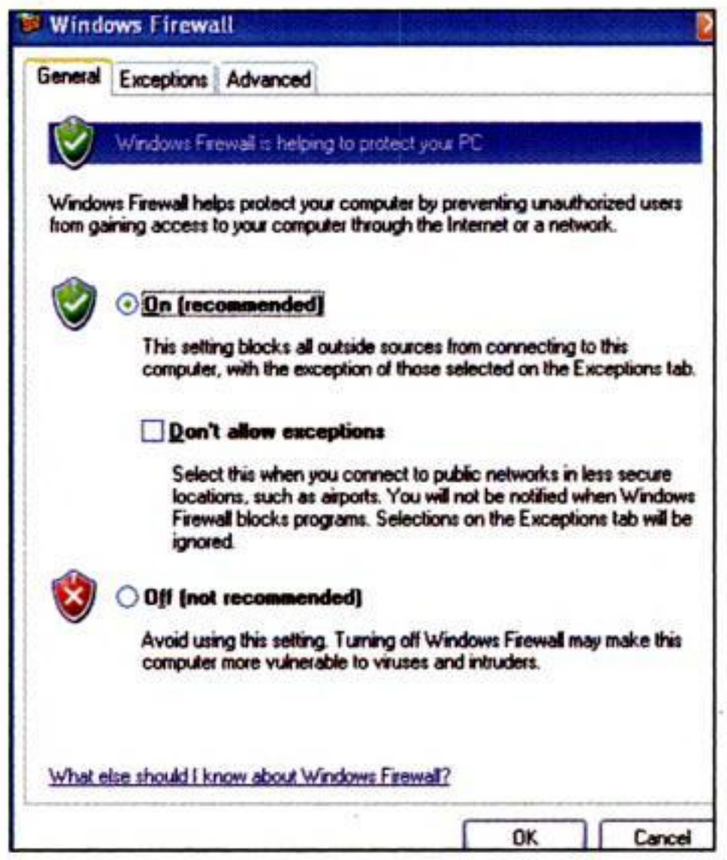
This may be hard to believe, but testing has shown it takes only four minutes for a clean install of Windows XP exposed to the Internet to be infected by self-propagating worms! That's why you shouldn't connect your PC to the net without a firewall!

Now, it's time to get down to the business of installing drivers. When you install new drivers, Windows will frequently prompt you to reboot your system. It's absolutely vital you reboot your computer when an install program tells you to. If you don't, misfortune is sure to follow.

We recommend installing the latest chipset drivers from your mobo manufacturer's web site first. These drivers control things like your hard drive controller and videocard interface. Running the latest drivers will greatly increase the stability of your system! Reboot when prompted.

After installing the motherboard chipset drivers, install the latest version of DirectX (assuming there's a newer version of DirectX than the one included in Service Pack 2). The newest version of DirectX will always be in the Optional Components list at **www.windowsupdate.com.** Next, we recommend you run the latest reference driver for your videocard, which will be available at **www.ati.com** or **www.nvidia.com.**

Finally, install the drivers for any other devices connected to your PC, reconnect all your USB devices, and take your system for a test spin to make sure it's working as expected.


Windows Firewall
General
Exceptions
Advanced
Windows Firewall is helping to protect your PC
Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
On (recommended)
This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Don't allow exceptions
Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
Off (not recommended)
Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
What else should I know about Windows Firewall?
OK
Cancel

The firewall built into Windows XP SP2 is sufficient to start. Make sure it's enabled by going to the Windows Firewall control panel.

TIDYING UP WINDOWS

Now that Windows is up and running, it's time to do a final housekeeping pass. First, you should download and install any remaining critical updates from **www.windowsupdate.com.** Next, you can turn off all of WinXP's annoying little "features." Here's a short list of Windows' worst antagonists.

- **Disable the annoying search helper:** Go to Start, then Search, and click "Turn off animated character."

- **Resize the Recycle Bin and System Restore:** Right-click the Recycle Bin and go to Properties. Move the slider from 10 percent—that's 40GB of a 400GB drive—to a more reasonable 1 percent. The System Restore setting is in the System control panel. Right-click My Computer and select Properties, or—shortcut alert!—press the Windows key and Pause/Break, then click System Restore. Move that slider until System Restore uses only about 600MB of space.

- **Set the Automatic Update interval:** While you're in the System control panel, click the Automatic Updates tab. If you're not going to remember to install updates fairly regularly, you *absolutely must* set Windows to automatically download and install updates for you every week.

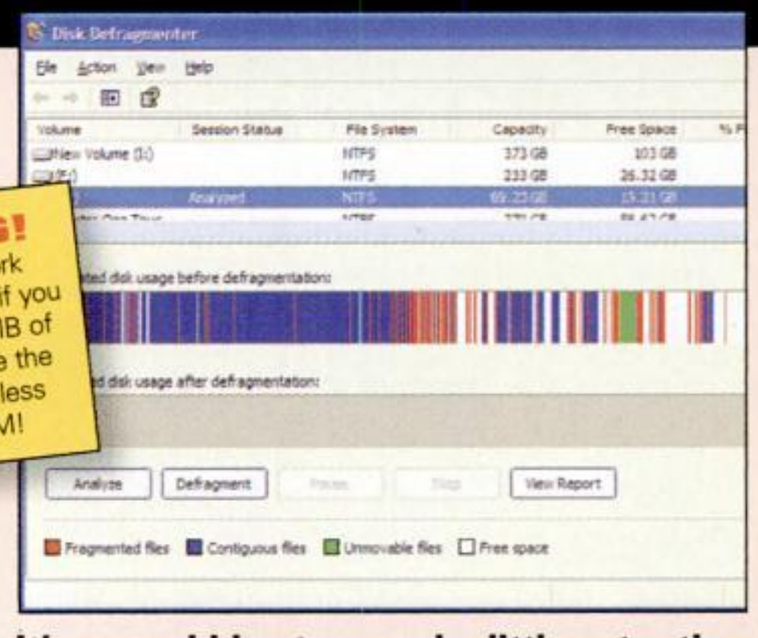
DEFRAG LIKE MAD

Before you start installing applications, it's a good idea to give your hard drive a powerful defrag (in the *Maximum PC* Lab, we do this on our test beds before any critical tests). When Windows is running, the pagefile and the portions of the drive reserved for System Restore checkpoints cannot be defragged, so before defragging, we always disable both System Restore and the pagefile.

To disable System Restore, open the System control panel (Windows key and Pause/Break) and click the System Restore tab. Now check "Turn off System Restore." To temporarily disable the pagefile, click the Advanced tab, and click the Settings button in the Performance section. Click the Advanced tab again, and then click Change. Click "No paging file," then keep pressing OK until you're back at the Desktop. Reboot your computer.

When you reboot, open up defrag by opening My Computer and right-clicking your C: drive. Go to Properties, then Tools, then Defragment Now, and on the subsequent screen, click Defragment. After defrag finishes, go back into the System control panel and re-enable the pagefile and System Restore. Reboot your computer, and it should purr quite nicely.

WARNING!
Windows will not work without the pagefile if you have less than 256MB of RAM. Do *not* disable the pagefile if you have less than 256MB of RAM!



It's a good idea to spend a little extra time and defragment the space used by the pagefile and System Restore.

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WINXP DOs & DON'Ts

DO run weekly antivirus and anti-spyware scans. This cannot be emphasized enough.

DON'T forget the firewall. A firewall will protect even an unpatched system in the event a new, undocumented worm attacks.

DO set your antivirus software to scan every new download and every e-mail attachment.

DON'T assume your virus and spyware definitions are up to date. Check them frequently to make sure everything is in order.

DO run several anti-spyware apps regularly. No single anti-spyware app we tested detected all the spyware on our test system.

DON'T freak out if your firewall warns you your computer is being probed. Every computer on the Internet is regularly scanned by malicious programs.

DO ensure your firewall is working properly and your virus definitions are up to date before you connect your laptop to a foreign network. Public Wi-Fi networks are the Thai brothels of the PC world.

DON'T hide file extensions in Windows. Tricky viruses hide their real extensions behind an innocuous extension. For example, the file dirtyvirus.jpg.exe will look like dirtyvirus.jpg in many e-mail programs. Show file extensions by going to the Folder Options control panel, clicking the View tab, and ensuring that "Hide extensions for known file types" is unchecked.

Protect Your PC—the Right Way

You can't put your PC into a God mode of invulnerability, but you can load it to the hilt with defensive weaponry

No amount of protective software will keep spyware, viruses, and worms off of your PC if you don't practice safe computing. Likewise, if your computer isn't protected with a firewall and antivirus software, it *will be infected* no matter how careful you are. To stay safe, you need to make good decisions and have the right software installed.

PROPHYLACTIC APPS FOR INFECTION PREVENTION

Your firewall software is your first line of defense. It's the barrier between your computer and all the other computers it's networked with (either on a LAN or the Internet at large). Your antivirus software is your second line of defense. It will identify, isolate, torture, and then destroy any virus-infected files that find their way into your PC. Besides regularly scanning your hard drives for nogoodniks, a solid antivirus app will inspect all new files that are downloaded or created on your computer, and keep an eye peeled for virus-like activities.

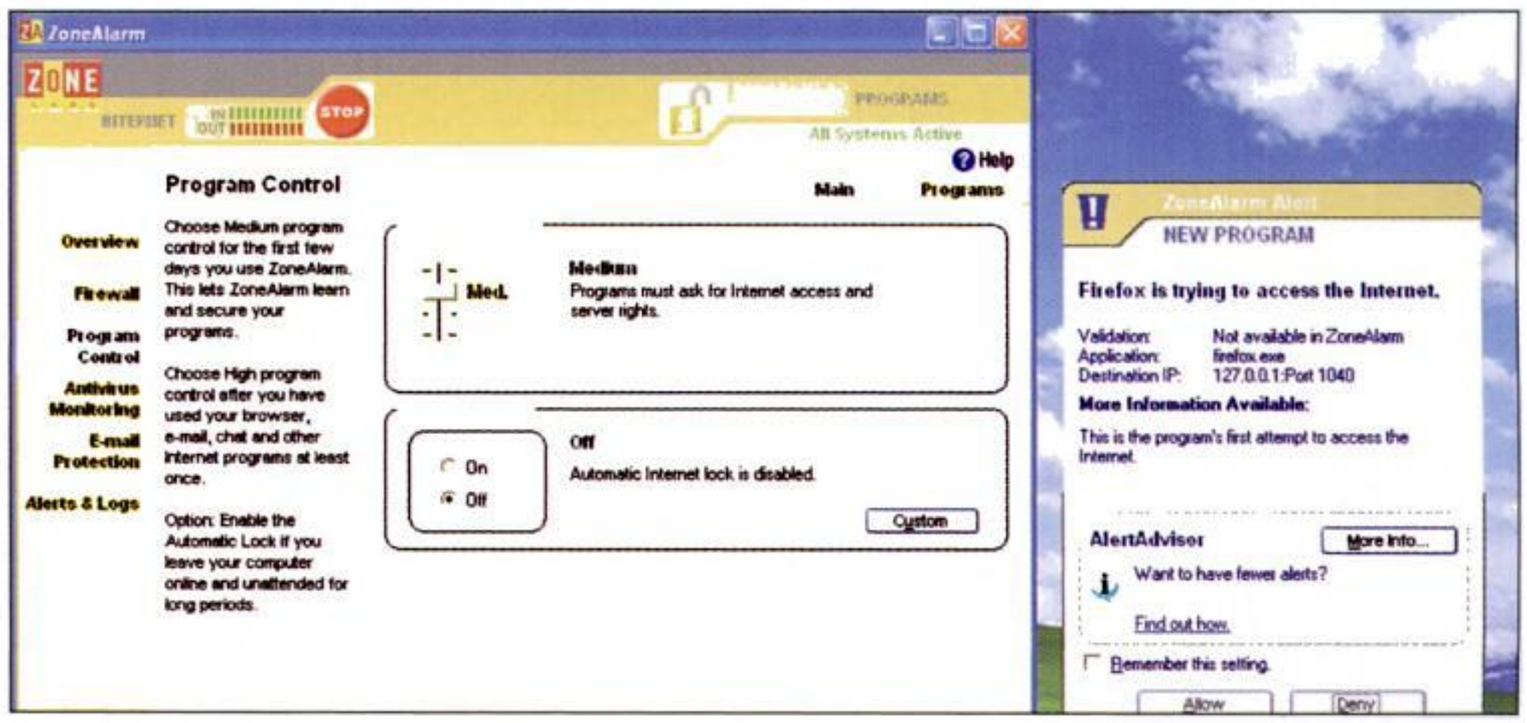
You'll also want to regularly scan your computer with several anti-spyware apps from different companies, as no single app seems to catch all the different varieties of spyware out there. Anti-spyware apps work much like antivirus apps: They scan your computer for known spyware programs, identify them for you, and help you give 'em the heave-ho.

Let's take a close look at different protection apps...

THE FIREWALL: COMPUTING'S FEROCIOUS ROTTWEILER

Until recently, firewall software was the exclusive purview of large corporate IT departments, not home users. That all changed when worms—which spread from Windows machine to Windows machine without user action—infected thousands of computers connected to the net. Worms exploit bugs in Windows (such as *Word* and *Outlook*), but they can't get to the software if a computer is running a properly configured firewall. They'll be stopped at the gate. And even in the unlikely event that a firewalled machine is infected, the firewall will at least prevent the worm from spreading further.

The firewall built into Service Pack 2 for Windows XP offers decent baseline protection, but the free version of *ZoneAlarm* (**www.zonelabs.com**) is just as easy to use, much more flexible, and it delivers more features. *ZoneAlarm* works on a per-application basis—when a program tries to connect to the Internet, the firewall asks you whether that app has permission to connect. Without your



Firewall software, such as *ZoneAlarm*, serves as a gatekeeper. No applications on your PC can connect to the Internet, and no machines on the Internet can connect to your PC, unless you specifically grant them permission via your firewall.

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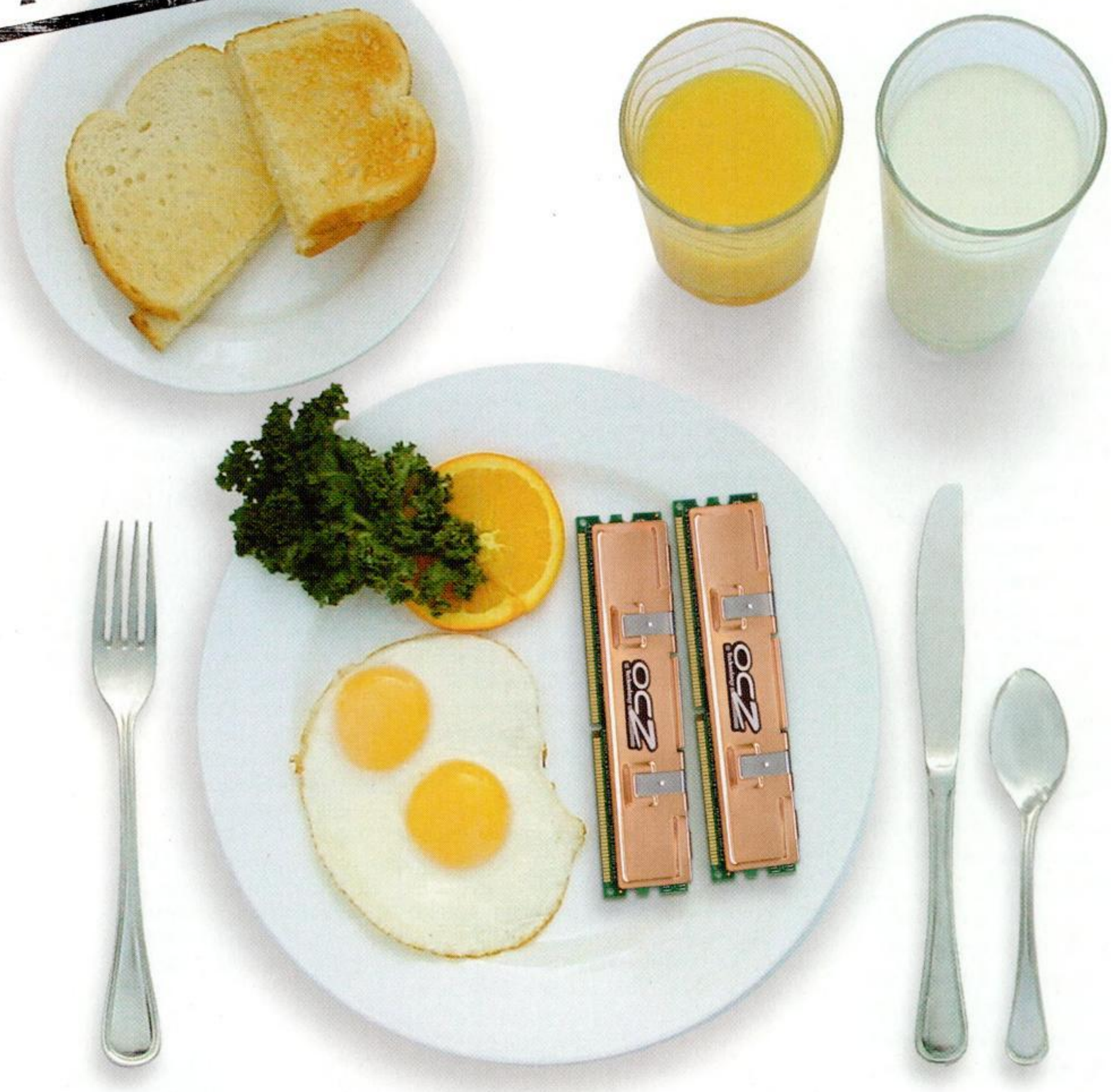
SATISFY YOUR APPETITE FOR PERFORMANCE...



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WINXP DOs & DON'Ts

DO keep your software (including Windows) patched and up-to-date.

DO use safer programs like *Firefox* and *Thunderbird* instead of *Internet Explorer* and *Outlook Express.* Because these alternative, open-source programs are less popular and don't support inherently unsecure ActiveX controls, they're less vulnerable to attack.

DON'T leave ActiveX enabled for all web sites. Disable it by going to the Security tab of the Internet control panel, clicking Internet, then Custom Level, and selecting Disable for every object in the Active X section.

DO enable ActiveX *only* for the Windows Update site so you can download Windows updates. Go back to the Security tab of the Internet control panel, select Trusted Sites, then click Sites and add http://*.microsoft.com.

DON'T install apps from web sites you don't trust. Most spyware piggybacks on tiny downloads pretending to be utilities or applets necessary to view certain web sites.

DON'T click on e-mail attachments from strangers, or download software from pop-up ads. That free kitten screensaver or cursor collection might be tempting, but you're sure to catch web cooties if you take the bait.

DO stay away from peer-to-peer apps! Apps like *Kazaa* are chock-full of spyware! Free music isn't worth the price you pay in blood.

permission, the app will be denied online access. *ZoneAlarm* also prevents other computers from even seeing that your PC is connected to the Internet, making your machine essentially invisible to bad guys. Most firewall developers issue infrequent software updates maybe one a month. Nonetheless, you should always take advantage of these downloads when they're offered.

At this point, you might be wondering about the usefulness of the firewall built into your network router. The short story is that this firewall will protect your PC from external threats, but it won't do jack-diddly if a worm accidentally gets loose inside your local network. In fact, we've seen hardened corporate networks brought to their knees by a single infected laptop that was inadvertently connected to a wireless LAN. So, even if your router sports a firewall, it pays to install a software firewall on every computer on your network, *especially* laptops and other machines that frequently travel outside your home.

ANTIVIRUS SOFTWARE: YOUR PC'S IMMUNE SYSTEM

There are loads of good antivirus apps available, but for home users, we prefer Grisoft's free version of *AVG* (**www.grisoft.com**). It does everything we expect a good antivirus program to do, and it doesn't cost a penny. Regardless of which antivirus software you choose, you should run a complete scan of your computer at least once a week, and update your antivirus definition file (the list of known viruses your software will scan for) several times a week. After all, the real strength of good antivirus software doesn't lie in the client application—it lies in the software developer's ability to suss out new threats, and get them recognized in a definition file as soon as possible.

ANTI-SPYWARE SOFTWARE: KILLING GNATS AND NITS

Spyware is the downfall of many an innocent PC user. There's an almost infinite number of these damnable apps, which millions of innocent users have unwittingly installed, crippling their computers in the process. Most spyware is difficult, if not impossible, to remove using standard techniques. Instead, you must use a spyware removal tool or manually edit Registry and configuration files, and delete the detritus that spyware spews all over your hard drive—if you can locate all that crap in the first place.

Luckily for you, most spyware removal programs are either cheap or free. When used together, programs like *Spybot Search & Destroy* (**www.safer-networking.org**), *Ad-Aware SE Personal Edition* (**www.lavasoftusa.com**), and *Spy Sweeper* (**www.webroot.com**) are capable of determining the species of spyware that taints your computer, and removing it.

Unfortunately, the scumbags and pusbuckets who write spyware constantly modify their apps to make them more difficult to detect and remove. So, just like antivirus applications, anti-spyware programs depend on frequently updated definition files. We suggest you update your spyware definitions whenever you update your virus definitions, and scan your hard drives weekly to ensure that infections don't run unchecked.

MALWARE DEFINED

Malware is a catch-all term for any type of unwanted software that wages mischief on your computer. Here are some definitions of specific malware types.

- **Virus:** A small program that causes damage to a computer. Viruses usually require user action to spread and are transmitted through e-mail attachments disguised as "friendly" programs.
- **Worm:** A type of program that spreads across networks automatically. Unlike a garden-variety virus, a worm doesn't depend on the user for propagation.
- **Spyware:** A program that gathers your personal data (web-surfing habits, e-mail addresses, even passwords and credit card numbers), and then transmits the data to some evil home base.
- **Adware:** A program that displays web advertisements, often in annoying pop-up windows that are seemingly impossible to close.
- **Death by 1,000 rabid rat bites:** How we'd like to terminate the human refuse who create malware.

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Maintain Your PC—the Right Way

There's no shame in making backups. Go commando, and you'll wish you hadn't

Now that you've installed your OS and it's as fresh and minty as an Altoid, you'd be wise to develop a plan to keep it that way. With a little care and planning, you can keep your newly installed copy of Windows XP free from spyware and viruses, backed up and ready to reload in case disaster strikes. Follow along as we show you how to maintain your PC the right way—the *Maximum PC* way.

DEVELOP A DEFENSIVE PLAN

The data you lovingly place on your hard drive typically falls into several categories, each of varying importance. One category is the Windows installation itself, which you may or may not care too deeply about. The second category is your apps, games, and utilities, which are usually replaceable (though reinstallation is a PITA, we won't kid you). The third category we define as "data": digital photos, videos, *Word* documents, MP3s, saved-game files, and so forth. This is the stuff that's either irreplaceable or difficult to reacquire, so you should take great care to protect it. Let's examine a few preservation strategies, shall we?

GET RAIDED

Implementing a RAID 1 array is a good place to start for data protection. In this type of RAID setup, every bit of data you write to your system is mirrored on two separate hard drives. So in the event of a terminal drive failure, you'll still have all your data intact on the remaining drive. Of course, in order to use RAID, you'll need a hardware RAID controller, either on your motherboard or on a PCI add-in card. The bigger caveat, however, is that RAID 1 only protects your data from drive failure; if your machine gets infected with a virus, or something else scrambles your data, it's gone! So even if you use RAID 1, it's still important that you perform regular backups.

INVEST IN AN EXTERNAL BACKUP DRIVE

External hard drives are ridiculously cheap these days, so there's no excuse not to spring for an external backup drive. There are scads of drives on the market, and most of them include excellent backup software, but we recommend the 250GB Western Digital Media Center Dual-Option backup drive ($330, **www.wdc.com**). It's fast, roomy, and includes FireWire and USB 2.0 connections.

Most of the time, the backup software will have you set up a simple script that does something like "back up all of the contents of your C: drive every week and put it on the F: drive." Once all this is configured, the backup will run on its own according to schedule. These drives make backing up your system really painless, and we can't emphasize enough how important it is to keep a current backup of your data.

You have no excuse not to have an external backup drive, so either get a basic "drive in a box" type or splurge on something like the WD Media Center above (see page 45 for more).

TAKE CHARGE OF YOUR DOCUMENTS

Because most of us use the My Documents folder as a catch-all repository for everything from dog-show photos to tax returns, it's a good idea to store this directory in the safest location possible. And, yes, you do have the option of pointing your My Documents folder to any location on any hard drive. To change the location of this folder, simply right-click it and select Properties, then click "move." A dialog box will open asking where you'd like to move it to, so select the new location (a new drive, a new partition, etc.) and click OK. When it asks if you'd like to move all your documents to the new location, click "yes." On the surface you won't notice any change at all, as your documents will still be there when you click My Documents, but your files will be safely stored on another drive.

Backing up data ranks right up there with flossing in terms of activities we look forward to, but with all your personal data in one folder, manual backups are quick and simple. So do yourself a favor—quit saving files to your desktop. Save them to someplace in My Documents, and then protect this folder with your life.

THE ART OF SAFE DOWNLOADING AND INSTALLING

There are few computing practices more dangerous than randomly downloading and installing apps and utilities. Sure, you can usually uninstall them, but some apps carry spyware payloads that are difficult or impossible to expunge from a system. Even in best-case scenarios, uninstalled apps can leave bits of data peppered across your hard drive.

We always check the user comments on popular shareware sites (such as Download.com) before installing new software. It's better to read about other people's misfortune than to experience it firsthand. Once you decide to try a new app, you should make certain you get it from a reputable source.

Also, if you really want to experiment with a variety of unknown apps from a popular shareware site, we recommend you create a limited user account in WinXP. (Go to Control Panel, Users, then click "Create new account." Make sure it's desig-

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WINXP DOs & DON'Ts

DON'T compress the contents of your hard drive to save space. Compression slows down your whole machine. Just buy a new drive.

DON'T download, install, and uninstall random apps and screensavers from the Internet. They're common vectors for web cooties.

DON'T open e-mail attachments from people you don't know, or executables from people you do know (they should know better!)

DON'T install Windows XP over a previous installation. Always format your hard drive and install Windows from scratch for optimal long-term stability.

DON'T install more than one antivirus utility and firewall. These programs need low-level access to the operating system; it can cause major problems for Windows if multiple apps are competing for resources.

DO block firewall access to programs you're unfamiliar with.

DO create Windows XP restore points before installing drivers, service packs, or other system-altering software.

DO be wary of "system optimization" software that doesn't tell you exactly what it's going to do! These apps usually deliver nothing more than snake oil.

DO clean the fans inside your PC case regularly in order to keep them running at maximum efficiency.

DO defragment your hard drive periodically to ensure maximum transfer rates.

DO run "msconfig" occasionally and trim your PC's startup programs to just the essentials.

nated as a limited account.) By using the limited account, the shareware installer won't be able to install files in protected areas of your drive—like the Windows directory. Once the app is installed on the limited account, scan your computer for spyware. If nothing shows up, feel free to reinstall the software to your primary account.

Tricky folks, aren't we?

Current Drive
Diagnostic Code:
This drive is failing. If you do not have a recent backup of the data please do so now if possible. Write down the diagnostic code and contact Maxtor via the internet www.maxtor.com Online(RMA) Return Merchandise Authorization is available 24 hours a day with a valid PowerMax diagnostic code. Select the Warranty Services link from our home page.
Press any key to continue.

You can always run a vendor-provided diagnostic utility on your drive, but be prepared for bad news.

KEEP YOUR DRIVE DEFRAG'D

When you install applications on your hard drive, the data is not written in neat, sequential rows across the platters, but rather wherever there happens to be room. Data belonging to sundry documents and programs is typically scattered all over your drive, so when you install a new program, it will be installed with a chunk of code here, a chunk of code there, and so forth. This condition is known as "fragmentation," because each file may be broken up and distributed over several different drive locations. Accessing a fragmented file takes longer than accessing one that's written sequentially, because the hard drive's read/write heads have to skip and jump all over the drive to pick up the pieces of the file.

You can remedy this situation with regular drive defragmentation, which causes Windows to pick up pieces of files and move them together into sequential arrangements (or at least as sequential as possible). The defragment utility built into Windows XP (really just a stripped-down version of Executive Software's *Diskeeper*) gets the job done just fine. We recommend defragging your drive at least once a month.

PAY ATTENTION TO DRIVE NOISE—IT MAY BE A CRY FOR HELP

Despite the furious activity taking place within a hard drive, these storage devices are usually exceptionally quiet, as the read/write heads float on top of the platters. What's more, newer hard drives use fluid bearings to reduce noise even further. During regular hard drive operation, all you should hear is the sound of read/write heads moving back and forth over platters, which produces a soft clicking noise. You should never, *ever* hear a noise that sounds like grinding or metal-on-metal rubbing.

If you ever hear any strange noises coming from your drive, *immediately* back up its contents. You should also download the drive diagnostic utility specific to your drive (it should be available on your drive manufacturer's web site). If you suspect your drive is having problems, download the appropriate utility, and run it to see if your drive is having a gastrointestinal disorder. You can also use the bundled Scandisk utility in WinXP, which is accessible by opening My Computer, right-clicking your drive, selecting Tools, and clicking "scan now." ■

Maintenance Schedule

Following a strict regimen of antivirus scans and spyware sweeps *will* protect your PC from malware. The good news is you can probably configure your apps to do the legwork automatically.

1. Download antivirus definitions—daily
2. Download anti-spyware definitions—weekly
3. Perform a full antivirus scan—weekly
4. Perform a full anti-spyware scan—weekly
5. Check firewall software for updates—monthly
6. Defrag your hard drives—monthly
7. Check for Windows updates—twice a month

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Backup-Drive Brouhaha

Six enormous drives that will help you sleep better at night

Most people consider data backup a cautious task performed only by old people, like saving used tinfoil or driving a Rascal. But the truth is, a lot of cool people back up their data. What do you think Snoop Dogg does with the tracks he's created for an upcoming album? He backs them up, of course. Sure, he calls it a "bizzackup," but the message is clear—you need to protect yourself from data loss because we're all vulnerable to it.

With the falling prices and increasing simplicity of most of today's backup drives, there's little excuse not to have one. At the very least, a large portable USB drive should be in your possession to keep crucial files safe. Any one of the following six products will fill the backup void on your desktop quite nicely.

Western Digital 250GB Media Center

More than just a backup drive.

Western Digital's new Media Center backup drive is based on the company's superfast Caviar SE hard drive, and offers both FireWire and USB 2.0/1.1 connections. The "media center" aspect comes in the form of a USB hub and an 8-in-1 media reader—a great idea, as it integrates devices we'd otherwise have dangling from our PCs and accommodates convenient USB key usage (something we've long fantasized about). The media reader accepts all popular forms of removable media and even works when the drive is turned off. (The drive can be purchased as a non–Media Center version for $50 less.)

For backup purposes the drive includes Dantz Retrospect 6.5, which is extremely easy to use. While it offers numerous advanced features, its primary role of making backups is simple to master and hard to fault. An "Automatic backup" button on the drive's faceplate opens a wizard that walks you through creating a backup script that you schedule to run automatically. Or you can press the "On Demand" button on the drive's face to perform a spot-backup any time you choose. The drive also has a handy built-in feature that prevents it from being turned off during data transfer.

Overall, we're impressed with the Western Digital drive. The addition of the media center and other thoughtful touches show welcome innovation in a market that's largely bereft of fresh ideas.

Western Digital's new backup drive adds a ripple to the scene by integrating a media reader and USB port into the drive's plastic shell.

MAXIMUM PC VERDICT 9

+ HARD DRIVE

Big capacity, fast, easy to use, snazzy media center.

– HEARTACHE

Twice the cost of the desktop version of the same drive.

$400, ($350 w/o media center), www.wdc.com

Maxtor One Touch II

Bigger, better, faster—this backup drive gives us thrills *and* frills

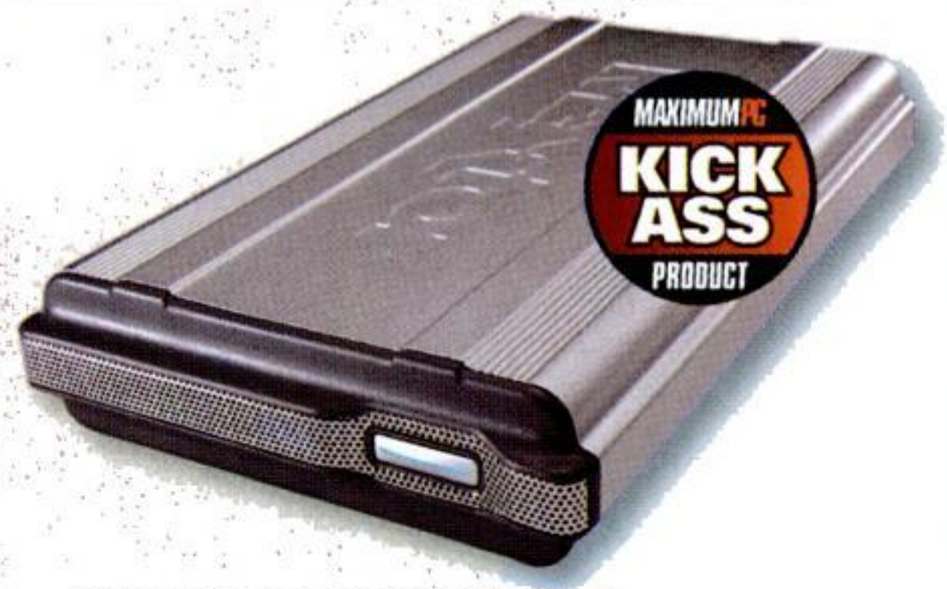
We reviewed the Maxtor One Touch backup drive in May, and bestowed it with a 9 verdict for its superb performance, despite a somewhat frill-less package. Undaunted, Maxtor has fired back with a totally revamped "solution" that injects a few extras missing in the first version.

For starters, Maxtor upgraded the new, improved One Touch with its top-shelf 7,200rpm Diamond Max 10 drive. As a result, capacity has increased from 250GB to a generous 300GB, and onboard cache has been doubled to 16MB. That's good news indeed. Connectivity options remain the same, including one USB 2.0 port and two FireWire ports on the rear of the aluminum outer shell, which are intended to daisy-chain a device off the One Touch. We wish it had an extra USB port on the back—or front—as well.

While we welcome the hardware upgrade, the real upgrade lies in the device's software. While it still uses Dantz Retrospect Express, Maxtor has added a slick front-end interface that takes any guesswork out of the process and makes it much easier to manage. Even the greenest newbie could use this software, as could your average Mac user (well, probably).

Maxtor added a few new features to the software as well. Our favorite is the ability to password-protect the One Touch. You can also create historical backups, making it possible to restore individual files from a particular day. Lab tests revealed that both of these features work flawlessly, as did every other aspect of the drive. Another cool new feature is the ability to choose between a very quiet "normal" mode, or a slightly louder "performance" mode that offers improved seek times.

In the final tally, we're impressed with the steps Maxtor took to significantly improve what was already a great product. If it had a media reader and USB hub—like the Western Digital Media Center—it would undoubtedly receive a perfect 10.



Talk about useful: Maxtor has converted the front of its One Touch drive into an electric razor.

MAXIMUM PC VERDICT 9

+ DIAMONDMAX

Best backup software ever, it has a huge capacity, and it's quiet.

– ZIRCONIAMAX

Unlike the WD competition, it lacks a media reader and USB hub.

$380 ($330 for 250GB), www.maxtor.com

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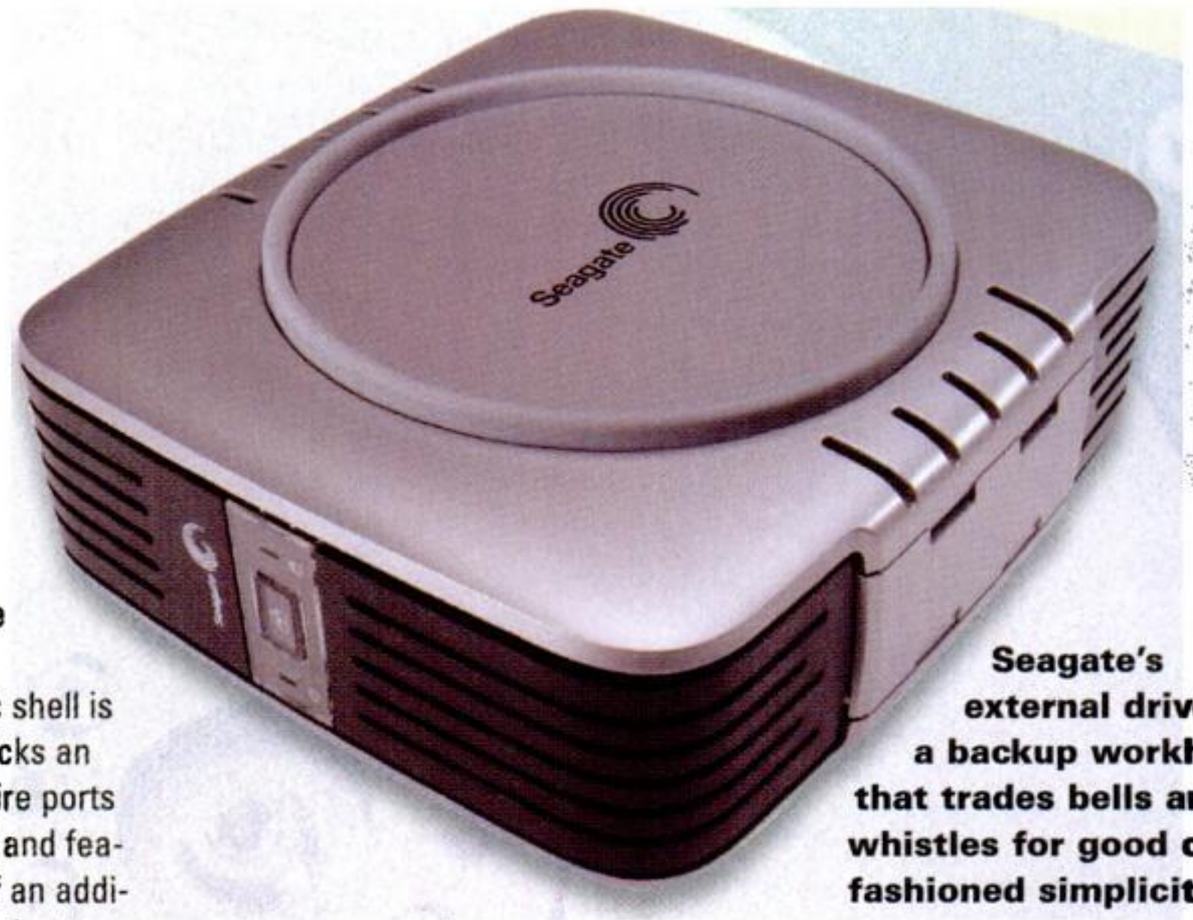
Backup-Drive Brouhaha

Seagate External USB/FireWire 160GB Drive

A streamlined approach to storage that doesn't cost an arm and a leg



Seagate's external drive is a backup workhorse that trades bells and whistles for good old-fashioned simplicity.

Unlike the Western Digital Media Center we reviewed on the previous page, this Seagate backup drive doesn't have any fancy extra bells and whistles. It's sort of like a German shepherd police dog that doesn't talk or drive cars—it performs capably, but there are clearly more talented dogs in Hollywood. Is that a bad thing? We don't think so, particularly because while the Seagate drive is smaller than other drives we've tested, it's also the most affordable backup drive on the market.

Let's take a look at the package. Housed inside the silver plastic shell is a 160GB Seagate drive that spins its little platters at 7,200rpm. It packs an 8MB buffer and includes a USB 2.0 interface as well as dual FireWire ports for daisy-chaining. The drive comes with an optional vertical stand and features a rubber ring on top that accommodates the piggy-backing of an additional Seagate external drive (it also makes a great CD holder). The front of the drive features a single button that triggers a pre-selected backup routine, as well as two orange lights for power and activity. A power switch resides on the drive's rear, though you won't need to turn it off as it's virtually silent.

Seagate's drive uses *BounceBack Express* for backup duties, which is a capable software package. It has all of the features of more sophisticated backup programs, but it's a bit cumbersome to use.

In lab tests, we experienced zero problems with the hardware, but had one small issue with the software. Even after performing our first backup to the Seagate drive, the push-button backup wouldn't work because the software kept failing to recognize the drive.

Overall, this is a good choice for price-conscious folks. It's not as big or as sophisticated as other drives on the market, but it does what it's supposed to with relative ease, and the USB/FireWire interfaces make it compatible with most PCs and Macs in existence.

MAXIMUM PC VERDICT 8

+ PUPPIES

Covers all the bases, is affordable, and sports a sleek exterior.

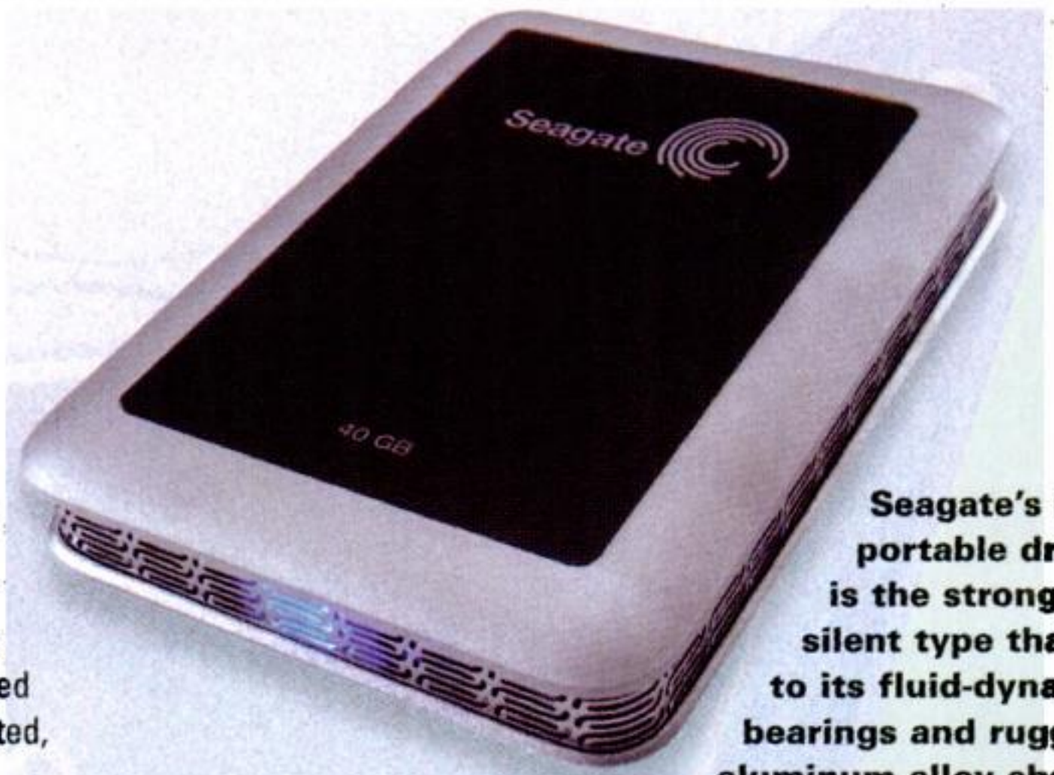
– YUPPIES

Software is not intuitive.

$250, www.seagate.com

Seagate 40GB USB 2.0 External Hard Drive

A rugged drive that gets the job done



Seagate's new portable drive is the strong, silent type thanks to its fluid-dynamic bearings and rugged aluminum alloy shell.

Now that Seagate is manufacturing 2.5-inch notebook drives, it makes perfect sense the company would enter the booming portable-storage market by slipping one of its new wee drives into a rugged shell and slapping a USB 2.0 bridge on it. The drive we tested here features a 40GB Seagate Momentus drive with a spindle speed of 5,400rpm, though Seagate also offers a 100GB version with the same spindle speed. The most notable characteristic of the drive is that it eschews a slim, sexy profile in favor of a slightly larger footprint and rugged aluminum alloy shell. It's definitely larger than other USB drives we've tested, but it feels like it's by far the most durable.

This USB 2.0/1.1 drive is solely bus-powered. Unlike other USB drives we've tested, Seagate's drive connects to the PC with a dual-head USB cable. One cable is marked data/power, and the other is for additional power when needed. About 50 percent of the time we needed to plug in both USB connectors to get enough power to the drive, but an equal number of times only the data/power cable was needed, even on front-mounted USB ports.

In Lab tests, the drive performed quite well in terms of throughput, averaging around 16MB/s write speeds, with read speeds hovering in the 20MB/s zone, which is excellent. It's also worth mentioning that the drive uses fluid bearings, making it extremely quiet during file transfers.

There is a software bundle, but it includes a few largely useless utilities (diagnostic, LBA addressing, and so on.) that are available for download on Seagate's web site. Then again, this is the kind of drive that doesn't need a software bundle because it doesn't require you to install any drivers. Still, it would have been nice to have a copy of the high-quality "toolkit" software Seagate includes with its 5GB Pocket drive, which allows you to create hidden partitions on a drive in case you loan it out and want to keep secret your DivX rip of *Bad Boys 2* (or some other embarrassing file).

MAXIMUM PC VERDICT 8

+ LEDS

Very rugged, decent capacity, no drivers required.

– IEDS

Larger-than-average formfactor, software bundle is largely useless, small capacity.

$160, www.seagate.com

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AMD Athlon™ 64 3500+
512KB L2 Cache
64-Bit Processor Socket 939
Model# ADA3500AWBOX

AMD Athlon™ 64 3700+
1MB L2 Cache
64-Bit Processor Socket 754
Model# ADA3700BOX

AMD Athlon™ 64 3800+
512KB L2 Cache
64-Bit Processor Socket 939
Model# ADA3800AWBOX

AMD Athlon™ 64 4000+
1MB L2 Cache
64-Bit Processor Socket 939
Model# ADA4000ASBOX

AMD Athlon™ 64 FX-55
1MB L2 Cache
64-Bit Processor Socket 939
Model# ADAFX55ASBOX

* These model numbers indicate relative software performance among AMD processors.

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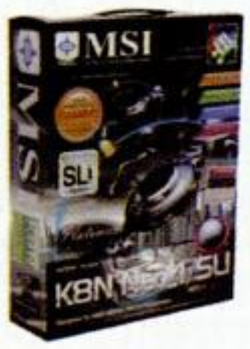
- Enhanced virus protection for the upcoming Microsoft® Windows® XP SP2
- Cool'n'Quiet™ technology offers performance-on-demand capability to reduce energy usage and enable a quiet environment for home computing

Motherboards



MSI K8N Neo4 Platinum SLI
NVIDIA nForce4 Chipset for AMD Socket 939 CPU 2x PCI-Express

Gigabyte GA-K8NS nForce3 250 Chipset for AMD Socket 754 CPU

Foxconn NF4UK8AA nForce4 Chipset for AMD Socket 939 CPU

Video Cards

ATI RADEON™ X700 Pro 256MB DDR 128-Bit PCI-Express

HIS Excalibur RADEON™ X800 Pro IceQ II 256MB GDDR3 8x AGP

Sapphire RADEON™ X850 XT PE 256MB GDDR3 256-Bit PCI-E - OEM

Cases

Aspire X-Navigator ATX Mid-Tower Case w/ 500 Watts Power Supply

MGE
Viper ATX Mid-Tower Case
500 Watts PSU
Blue UV Acylic Window

Raidmax
Mustang Black ATX-889WBP w/ 420 Watts PSU
Blue Lighting Display

LCD Monitors

Sony SDM-P234/B 23" TFT Active Matrix Wide Screen Flat Panel LCD 1920x1200 dpi

ViewSonic VP201s 20.1" TFT 1600x1200 dpi w/ USB 2.0 Hub

Samsung 710N-2-Black 17" a-si TFT/TN 1280x1024 dpi

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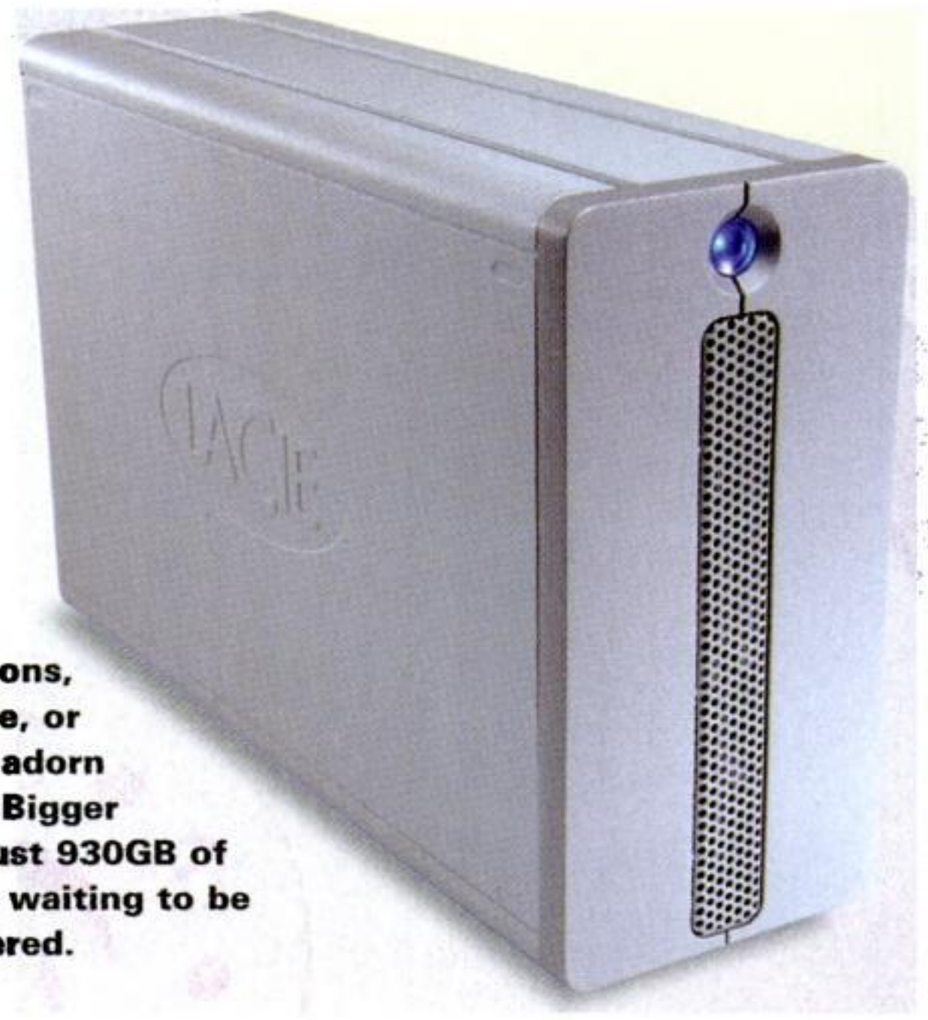
Backup-Drive Brouhaha

LaCie Bigger Disk

A humongous, no-frills hard drive that delivers the gigs



No buttons, software, or gizmos adorn LaCie's Bigger Disk—just 930GB of storage waiting to be deflowered.

Think you have a big disk? So did we, until we received LaCie's enormous Bigger Disk for review. It's touted as the biggest disk drive available, and we're inclined to agree, though it's actually four 250GB drives spanned together in a nifty aluminum alloy enclosure as opposed to a single terabyte disk. No matter, because it's still the highest-capacity external USB/FireWire hard drive we've ever seen.

If you're unfamiliar with drive spanning, it means that data is written to one drive first until it is full, then the next drive, and so on until the entire thing is full. If you're worried about thermal issues, don't be. The Bigger Disk includes its own cooling apparatus that spins up and down as needed to keep the drives cool. During testing there was an almost continuous stream of lukewarm air shooting out the exhaust port on the unit's backside, and the aluminum shell never became warm enough to warrant concern.

So, what do you do with this drive? Say goodbye to capacity concerns and fill 'er up. No backup software is included because the drive isn't being marketed as such, so all you have to do is begin downloading, ripping, and copying anything and everything in sight. We've found that the LaCie Bigger Disk makes for an ideal media storage drive, as it can store more than 100 hours of HDTV, 250 ripped DVDs, or literally tens of thousands of MP3s and pictures.

In Lab tests, transfer speeds averaged a respectable 22MB per second using the USB 2.0 interface. FireWire speeds were a smidge faster, though we used the slower 400MB interface rather than the rare FireWire 800 ports (of which there are two). There's also an "auto on" function that intelligently turns the drives on and off when necessary, but unfortunately it's available only for Mac users.

While we're impressed with the product's capacity (a 1.6TB version is also available), we're disappointed that it doesn't come bundled with any software whatsoever. Given the Bigger Disk's steep cost, some rudimentary backup or video-editing software would have made it a more compelling package.

MAXIMUM PC VERDICT 8

+ TERABYTE

Huge capacity, and includes cooling fans.

– OVERBITE

No software bundle.

$1,200, www.lacie.com

Arco EZBackup

Drive backups don't get much easier than this

Once you install your own hard drives, this honkin' two-drive cage slides into two 5.25-inch bays and lets you lock your system with the turn of a key.

The Arco EZBackup isn't a RAID 1 array, nor is it a backup drive. Instead, it's a quasi blend of the two that is both effective and unique. The EZBackup is strictly BYOD, and is made for IDE storage devices. It contains two removable drawers labeled "source" and "backup;" you install your primary hard drive in the source drawer and a backup drive of equal size in the second drawer. The entire apparatus is then plugged into a single power connector and a single IDE cable, and mounted in two adjacent 5.25-inch drive bays. It should be noted that the apparatus includes its own cooling fan, as well as a lock that allows you to keep the cage securely shut. There's also a security setting that allows you to lock the drives in such a way as to prevent the PC from booting.

Once the EZBackup is up and running, you use your primary drive like you always have. We found ourselves particularly impressed by the included software, which lets you create a mirror image on the second drive. This image is a 100 percent copy, meaning it's completely bootable in case the primary drive fails. Once the primary drive is mirrored, you simply create a backup schedule. The backup can be an entire image of the drive, new or modified files only, or specified folders and files. The software is extremely easy to use, and we experienced zero hassles in testing. Scheduled backups took place right on time, and after we copied the entire contents of our main disk to the second disk, we swapped the two drives and the system booted as if it were the primary drive.

The backup program can be operated either from within Windows or by manually pushing buttons on the unit's faceplate. The initial backup of our 250GB primary drive took about 10 hours from within Windows, but you can opt for a faster mode that reduces a complete backup to about four hours—you just can't use your computer when in this mode. With the initial backup out of the way, subsequent incremental backups were quick and painless.

All in all, we really like this drive system, but it's hard for us to justify the cost when we compare the EZBackup with a standard RAID 1 array, which is basically free and capable of accomplishing similar objectives.

MAXIMUM PC VERDICT 8

+ DRIVE SWAPPING

Guarantees 100 percent uptime, intuitive software.

– WIFE SWAPPING

Pricey, and the initial backup took forever.

$600, www.arcoide.com

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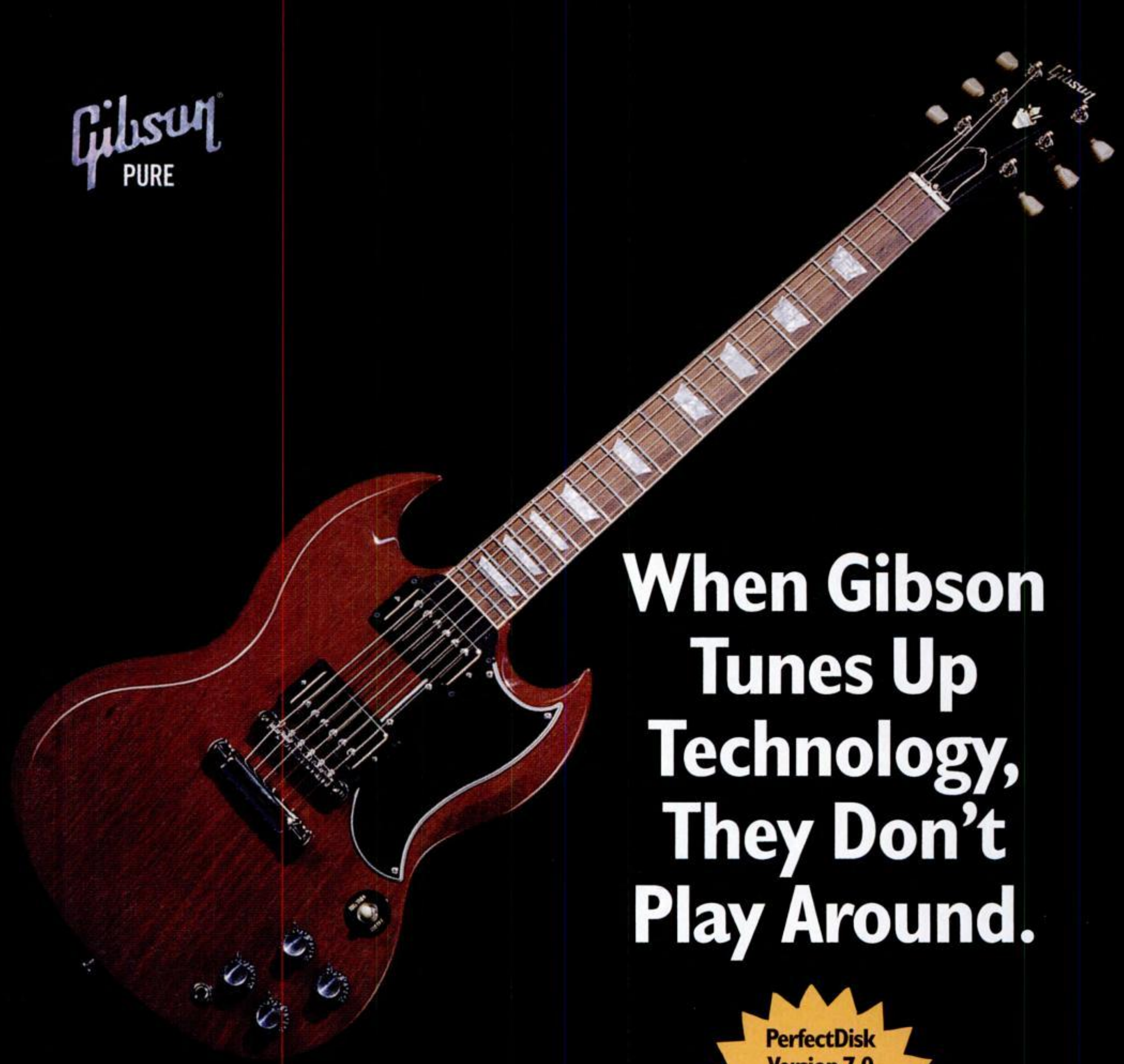

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PC MAGAZINE EDITORS' CHOICE June 8, 2004 PerfectDisk 6.0

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Trauma Kit 2005

Here's everything you need to resuscitate an illin' PC

It's 8:36 p.m. on Sunday when the call comes in on the squawk box: "Emergency 51, RP reports head-on collision between random blue screens and lockups on a 2001 PC at the corner of Maple and School streets. PC is needed to complete a critical assignment."

There's no time to ask questions. You grab your trauma box, spare power supply, and laptop, and roll Code 3 to your mom's house.

Responding to PC distress calls is all part of being a power user, so it behooves you to have the appropriate life-saving tools at the ready. We're cracking open *Maximum PC*'s Trauma Kit to give you an idea of the gear our Lab experts consider essential for troubleshooting and fixing most of the nasties a PC can toss at you. We don't call out the obvious things such as screws, IDE cables, and drives rails—you already know about that stuff. Instead, we highlight the latest must-have field dressings and ointments that can make your emergency PC repairs easier.

The centerpiece of our trauma kit is the expansive Plano 777 tackle box, available in sporting goods stores everywhere. We also hear you can use this for fishing...

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Industry-leading performance today ; ready for tomorrow's 64-bit software.

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AMD 64 Athlon™ FX

AMD 64 Athlon™

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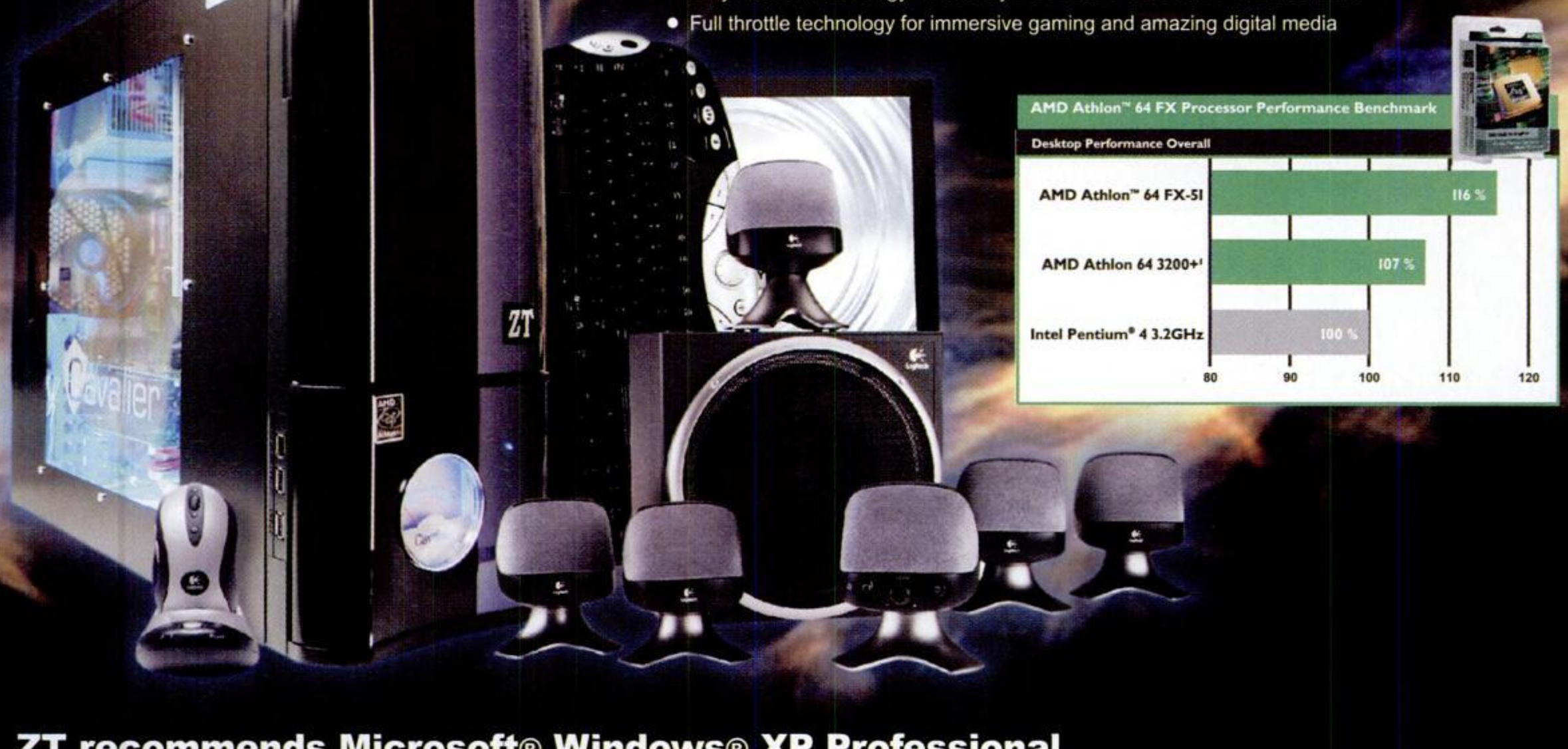

ZT recommends Microsoft® Windows® XP Professional

ZT EXPERT GAMING PC A7010 (SLI Technology)

- AMD Athlon™ 64 FX-55 Processor w/ HyperTransport™ Technology
- Microsoft® Windows® XP Home Edition w/SP2
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- 1GB Turbo Speed PC3200 Dual Channel DDR400
- Seagate® 400GB Serial ATA/150 Hard Drive (2 x 200GB in RAID 0 Configuration)
- 7 in 1 Media Reader & 1.44MB Floppy Drive
- DUAL 256MB NVIDIA GF 6800GT DDR3 "PCI-EXPRESS" (Dual Graphics for Twice the Performance)
- NEC 16x Dual Layer DVD±RW & CD-RW Drive
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- Seagate® 200GB Serial SATA/150 Hard Drive
- 7 in 1 Media Reader & 1.44MB Floppy Drive
- 128MB NVIDIA 6600GT DDR3 "PCI-EXPRESS"
- NEC 16x Dual Layer DVD±RW & CD-RW Combo Drive
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- 7.1-Channel Audio & Dual Gigabit LAN
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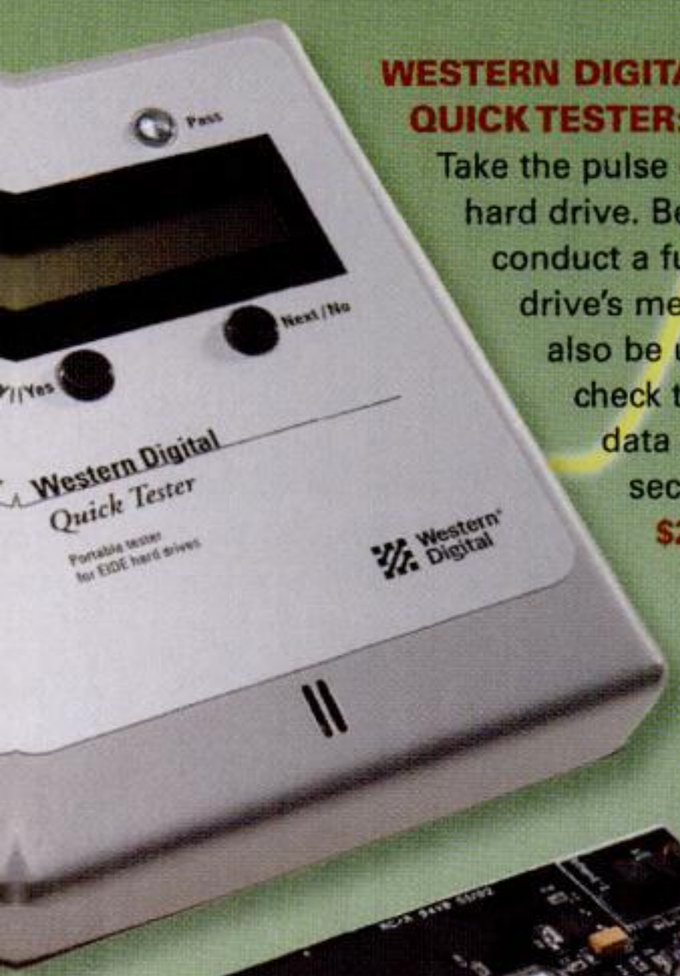
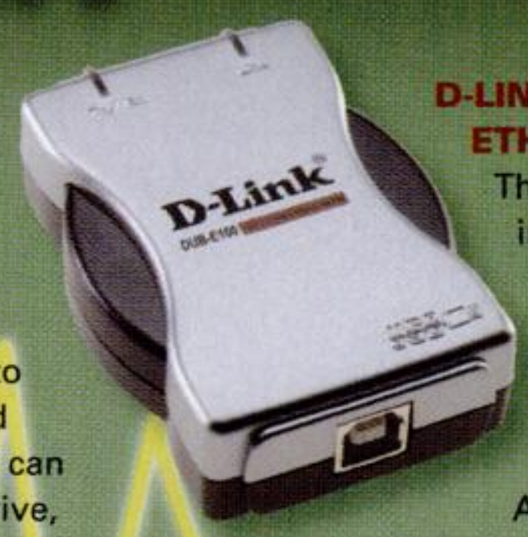
Trauma Kit 2005

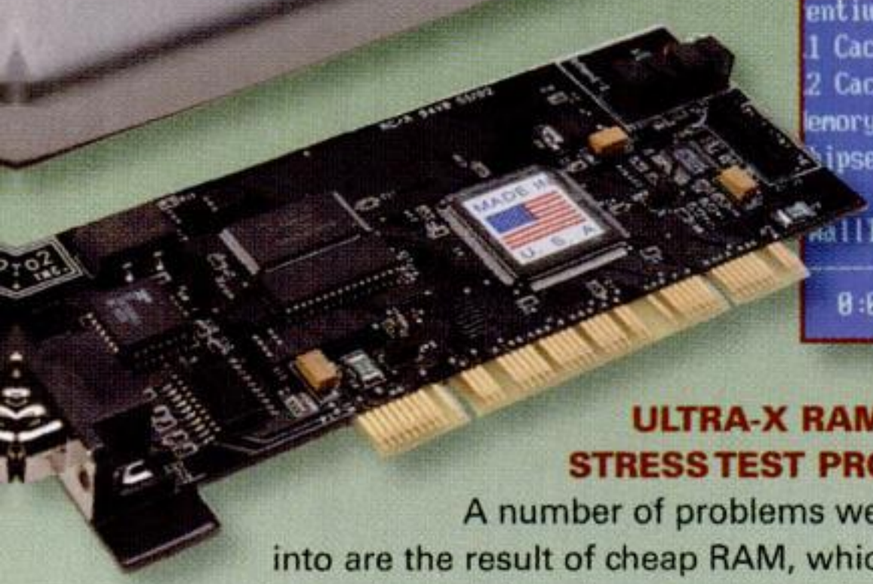


WESTERN DIGITAL QUICK TESTER: Take the pulse of any parallel IDE hard drive. Besides being able to conduct a full scan of the hard drive's media, the Quick Test can also be used to detect a drive, check the integrity of a parallel data cable, and write zeros to every sector of the hard disk. **$250, www.westerndigital.com**



D-LINK USB 2.0 FAST ETHERNET ADAPTER: This device comes in handy when you simply want to get a box up on the LAN without cracking open the case and facing The Attack Of The Dust Bunnies. Even better, D-Link's adapter is USB 2.0–capable, so you get zippy speeds for copying files to and from the machine, and it's completely bus-powered. **$25, www.dlink.com**

SEASONIC POWER ANGEL: You can't use the Angel to fix a computer, but you can use it to measure a PC's wattage or amp consumption, check its power factor efficiency, and check its line frequency—any of which could be a contributing factor to your PC problem. You can also use the Power Angel to show mom that plugging the PC, laser printer, mini fridge, and stereo into one 10-amp power strip isn't such a good idea. **$34, www.seasonic.com**



Memtest-86 v3.1
entium 4 2806Mhz
1 Cache 8K 23000MB/s
2 Cache 512K 19622MB/s
emory 768M 1054MB/s
ipset
Pass 5% #
Test 32% ##########
Test #3 [Moving inv, 8 bit pattern, cached]
Testing: 80K - 768M 768M
Pattern: dfdfdfdf
allTime Cached RsvdMem MemMap Cache ECC Test Pass Errors ECC Errs
0:00:45 768M 20M e820-Std on off Std 0 0 0

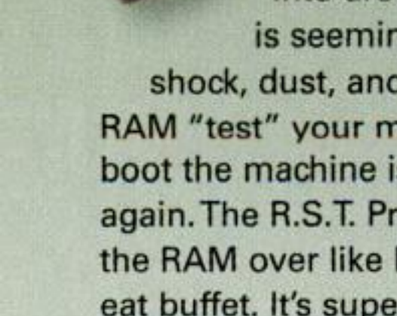
ULTRA-X RAM STRESS TEST PRO 2: A number of problems we run into are the result of cheap RAM, which is seemingly defenseless against static shock, dust, and hard looks. And if you think the RAM "test" your motherboard performs when you boot the machine is enough to catch all errors, think again. The R.S.T. Pro 2 slips into a PCI slot and works the RAM over like Rosie O'Donnell at an all-you-can-eat buffet. It's superior to a stand-alone RAM tester because the R.S.T. Pro 2 tests the RAM in its natural habitat—the motherboard. (Sometimes it's not the RAM that's bad, but the slot.) You can also use the R.S.T. Pro 2 to test the integrity of the BIOS' memory timings. **$700, www.ultra-x.com**

MEMTEST 86: Not everyone can afford a $700 memory tester. *Memtest 86* makes an acceptable substitute. This memory tester boots from a CD and lets you run a basic pattern test on RAM. It's not as comprehensive as the R.S.T. Pro 2, but its price can't be beat: it's free. Download it (or install it off the CD that came with this issue), burn an ISO to CD, and say thanks to creator Chris Brady. **Free, www.memtest86.com**

ULTRA-X P.H.D. PCI 2: We know the average Emergency Computer Technician won't have Ultra-X's pricey new P.H.D. PCI 2 mobo tester, but it sure can save you a lot of time. The new version plugs into both 3.3-volt and 5-volt PCI slots and lets you boot directly to the card so you can run 150 motherboard diagnostics, including tests for the DMA controller, interrupt controller, memory, and CPU. The P.H.D. PCI 2 can also test most of the peripherals hooked up to the PC. It can even boot a system without system RAM. **$995, www.ultra-x.com**

MUST-HAVE ITEMS

We consider these parts and tools the most essential to successful repair and triage



SPARE CPUS: If you're like us, you've probably accumulated a small tray of seemingly useless, low-speed CPUs. Turns out, those suckers are good for something—a simple swap will tell you if the CPU in a sick PC has died. We've press-ganged a S478 Celeron, S370 Pentium III, Slot 1 Pentium II, and Duron into servitude for king and country.

FLUKE NETWORKS MICROSCANNER PRO: Do you have a friend or coworker who just tosses bad network cables back into the bin instead of the garbage can? The MicroScanner Pro tells you how long a cable is and the location of a break, if any. It also will inform you how a cable is wired, where the shorts are, and test for continuity as well. Furthermore, the MicroScanner Pro can generate a tone that can be used to track down hidden LAN cables (provided you have the optional probe for detecting the tone.) **$450, www.flukenetworks.com**

ARCTIC SILVER 5: This has become our favorite thermal compound because it holds up so well over time. (Many thermal pastes eventually dry out, which can prevent you from running your CPU at full steam.) Take note, you need only apply a super-thin layer over the surface of the CPU—too much compound can actually impede performance. **$20 for a 12-gram tube, www.arcticsilver.com**

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I/O SHIELDS: Half the systems we work on no longer have their I/O shields—you know, that metal plate that fits around the PS/2, serial, and USB ports and keeps marbles, mice, and Cheez Whiz out of your machine. We collect spare I/O shields from gutted boxes, but mom-and-pop PC stores seem to always have a cardboard box full of them. For 25 cents a pop, it doesn't hurt to stock an assortment.

VIDEOCARDS: After all these years we've finally found a use for those old S3 Virge videocards. We use our PCI-based Virge as an alternative form of display should a machine's AGP card be bad, or even worse, if a PC is lacking an AGP slot (think Intel 810 chipset... *shudder*). Of course, we also carry an old GeForce AGP card for AGP component swap-outs.

FALCON DUST OFF: Sometimes dust bunnies can't be avoided. That's why we tote a mini can of Dust Off Jr. Blast the offending matter from a safe distance, hold your breath for a Mark Spitz minute, and then move in to perform the repair.
$5, www.falconsafety.com

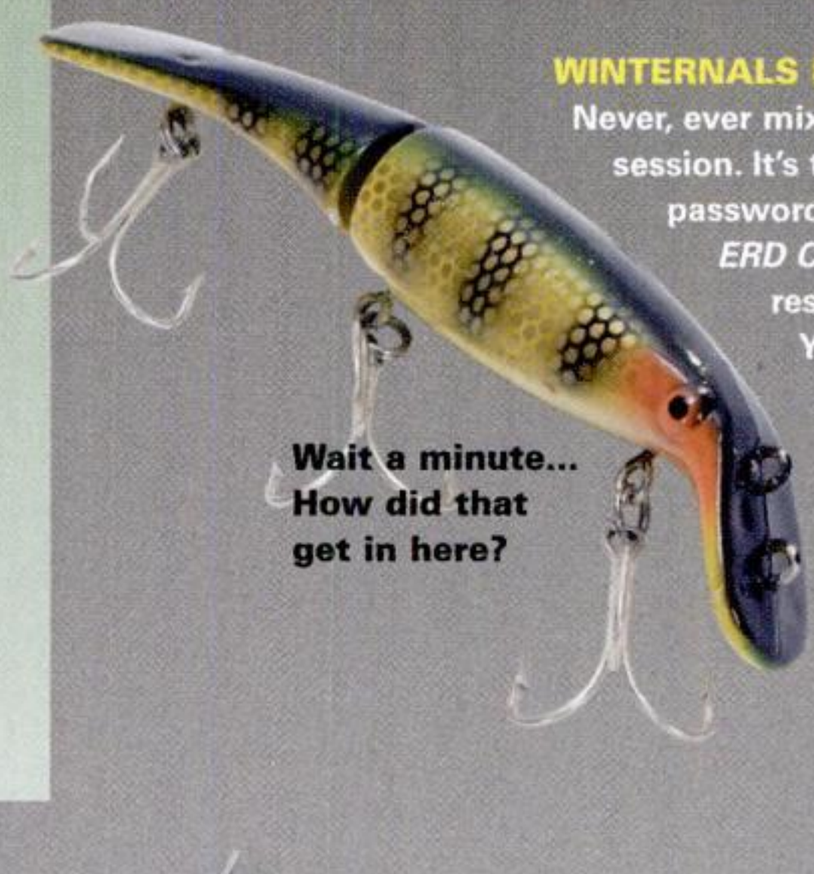
What do you carry in your box? Got a good tip on a must-have piece of hardware or software for fixing a busted PC? Let us know at input@maximumpc.com.

SNAP-ON SCREWDRIVER: Not as clumsy or unpredictable as an electric screwdriver, the Snap-On ratcheting, magnetic screwdriver is an elegant tool for a more civilized time. It's also probably the best damned screwdriver on Earth.
$50, www.snapon.com

WIHA SCREWDRIVER: If you've ever bunged up a screw with one of those cheap-ass "jewelers" tools, you'll be more than happy to pony up for a set of Wiha precision instruments. Made of hardened alloy steel, these babies are tough to bend.
$24, www.wihatools.com

BartPE: In addition to carrying an array of OS boot disks (don't have 'em? Go to bootdisk.com), you should consider building a *BartPE* disc. Courtesy of Bart Lagerweij, the program allows you to construct your own bootable CD or DVD with the ability to burn discs, scan for viruses, and copy files. Basically a stripped-down version of Windows XP, it lets you install drivers for various RAID and SCSI devices as well as your favorite utilities. *BartPE* is free, but you may need full versions of some utilities to get complete functionality, and you'll also need a version of your XP install disc with SP1 slipstreamed. *BartPE* is on the CD, and you can get it from www.nu2.nu. Follow the directions on page 67 to install plug-ins for a slick emergency boot disc.

HARD DRIVE: A 20GB or 30GB laptop hard drive with a 2.5-to-3.5-inch converter (about $5) makes a nifty rescue drive. We carry two: one with a clean install of Windows XP for booting a dead system, and a second blank drive to copy important files to. If you don't have one of these, just pack a couple of old 3.5-inch drives in your kit.



WINTERNALS ERD COMMANDER 2003: Never, ever mix a fifth of Stoli with a computing session. It's the perfect recipe for a new PC password that's soon forgotten. Fortunately, *ERD Commander 2003* comes to the rescue with its Locksmith feature: You can reset the password after booting the system from CD. *ERD Commander* is also handy for booting a system with a hosed OS so you can move vital files off the machine or access XP's restore points.
$150, www.erdcommander.com

RAM: If you can't afford the R.S.T. Pro 2 and didn't bother to download *Memtest 86*, you should at least carry some spare RAM. We keep on hand an assortment of PC133, DDR, and RDRAM modules that we've previously tested for integrity. Because there are a few RDRAM systems still kicking around, we also carry a set of C-RIMMs, or continuity RIMMs, that are required to fill the empty slots in an RDRAM system.

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Trauma Kit 2005 *IN ACTION*

Don't panic! Here's how our trauma kit can save you from three common PC disasters

SYMPTOM: YOUR LAPTOP WON'T BOOT

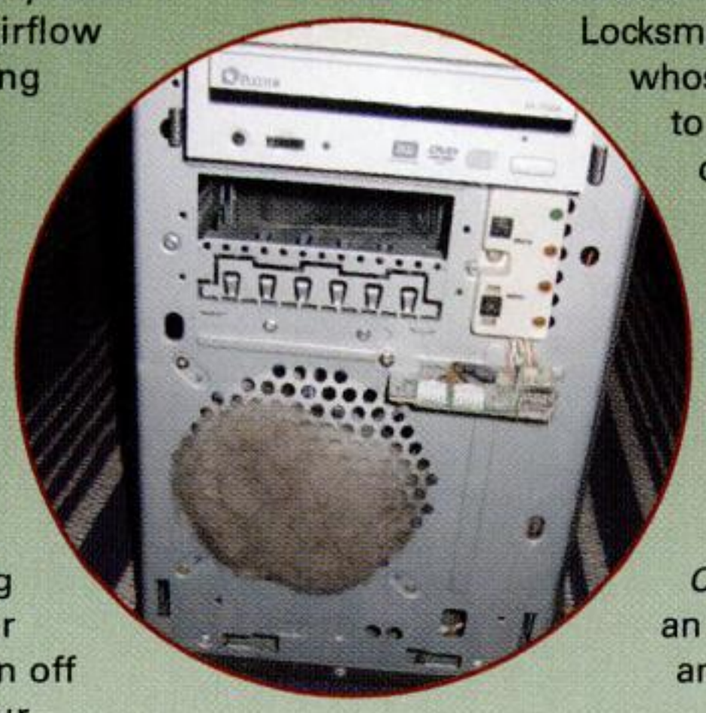
TRIAGE: More than anything else, data rescue should be your first priority. Open the laptop drive bay using the **Snap-On screwdriver**. The hard drive may be affixed to the chassis with tape, so be sure to remove the tape before attempting to extract the drive (and remember that this might violate your warranty). Gently—*gently*—remove the hard drive from the bay. Place on gurney and wheel over to a working PC. Power down the working PC. Connect the laptop hard drive to the **2.5-to-3.5-inch IDE converter**, and then connect that to the secondary IDE port using a standard IDE cable. Power on the PC. If the laptop drive is clicking or making any other unusual noises, we strongly recommend powering down and turning to a professional data-recovery service before the drive's condition deteriorates any further. Otherwise, evacuate all the data.

Now treat the situation like any other unbootable PC. Try to reinstall Windows, and if that doesn't work, pray you're still covered by warranty.

Laptop not booting? Rescue the data first.

SYMPTOM: YOUR PC SPONTANEOUSLY REBOOTS AND/OR SHUTS DOWN

TRIAGE: If it's a hot day, the CPU and/or motherboard may be trying to prevent a meltdown by simply shutting down the PC when its internal temperature exceeds safe levels. Don't just sit around waiting for the PC to cool off so you can power up again—flush out any cruft and improve the airflow in the interim. Using the can of **Dust Off**, clean out the intake and exhaust grills with quick, short bursts. Never depress the trigger for more than a half-second or you'll risk spraying moisture over your components. Clean off the surfaces of your expansion cards, CPU, and chipset using the same method. Check for any cables that can be tied off or tucked out of the way to improve airflow.



A half-inch of cat hair blocking your exhaust definitely counts as "cruft."

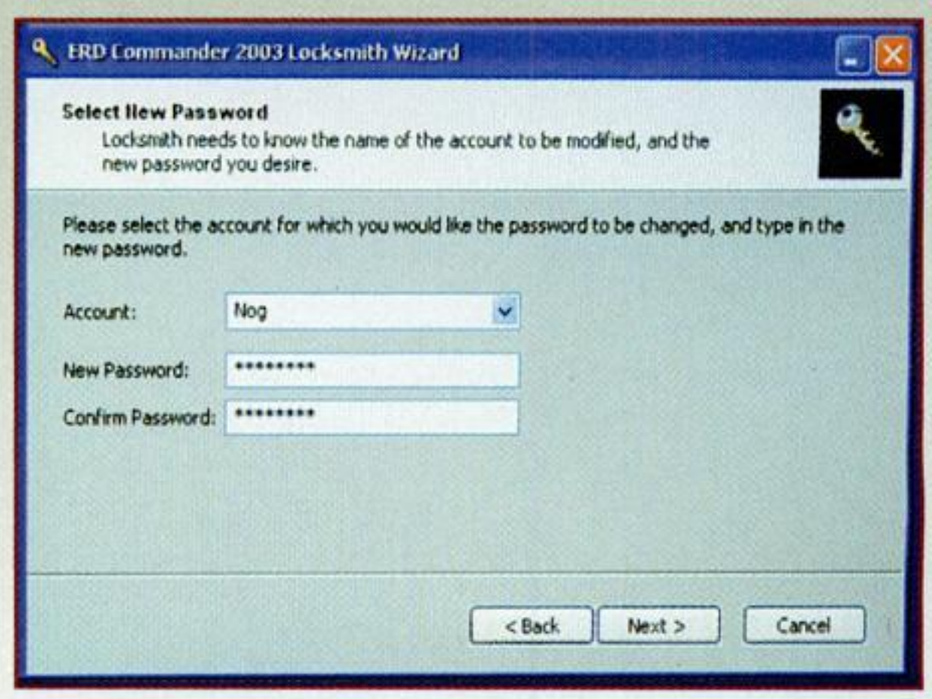
If the problem persists, update your videocard and motherboard chipset drivers to the latest version. Chipset drivers can be found at your motherboard manufacturer's web site, and video drivers will be at either **www.ati.com** or **www.nvidia.com**.

Still having spontaneous reboots? It's time to dig deeper, and your trauma box is well equipped for the task. Pop your CPU heatsink from its mount and clean off the old thermal grease with **99% isopropyl alcohol** and a paper towel. Then apply a thin layer of **Arctic Silver 5** and remount your heatsink on the CPU.

SYMPTOM: YOU FORGOT YOUR PASSWORD

TRIAGE: The Maximum PC Trauma Response Team is quite familiar with the forgotten password. It can be a major nuisance—unless you're prepared. To remedy the problem, pull out **Winternals' *ERD Commander 2003***. Just boot the system from the ERD Commander CD. The interface couldn't be simpler—it looks and operates just like Windows XP. Click Start > Administrative Tools > Locksmith. Select the account whose password you'd like to reset from the drop-down list, and specify a new password in the following screen. Then reboot and enter using your newly created password. Note that you *must* select a new password, so if you think you can use *ERD Commander* to "hack" into an account without raising any red flags, think again.

Another great feature of ***ERD Commander*** allows you to revert to earlier System Restore points from within the application—a lifesaver when you can't boot into Windows XP, even in Safe Mode. ■


ERD Commander 2003 Locksmith Wizard
Select New Password
Locksmith needs to know the name of the account to be modified, and the new password you desire.
Please select the account for which you would like the password to be changed, and type in the new password.
Account:
Nog
New Password:
Confirm Password:
< Back
Next >
Cancel

No password? No problem—if your trauma kit has *ERD Commander*.

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Rig Windows for Speed

Does your PC feel sluggish? These tried-and-true tweaks will provide a quick fix.

It's not just your imagination. Your computer really did run faster when it was new. But that was before you visited hundreds of websites, sent and received thousands of emails, created hundreds of documents, and used your PC for countless other purposes.

Part of the problem stems from the fact that Windows tracks many of the things you do on your computer: the websites you visit, the last directory you accessed on your hard drive, the files you've opened and closed...even the sizes of each of the windows you've fiddled with. The good news is that Windows XP does these things to make your life easier. The bad news is that managing all this minutiae can slow your computer to a crawl if it's not managed well. And Windows XP is not a good manager.

But you can be—even if you have five thumbs and you believe user manuals are a good substitute for sleeping pills. We've already shown you how to install XP the *Maximum PC* way, and how to keep it as healthy as possible. However, while the best cure might be a complete reinstall of Windows and a fresh start, you might not have the time or inclination to undertake the task, which can appear herculean. (It doesn't have to be: See our guide on page 36.) Think of the following tips as speed-inducing Cliff Notes—quick and simple things you can try to eek a little extra horsepower out of Windows right now. We'll even provide many of the tools in the form of software on the disc (some free, some trialware). Don't get discouraged if you don't see an apparent difference from any single change you make—it's the cumulative effect that we're working for.

Memorable Statistics

Every version of Windows that Microsoft has ever produced has been what computer geeks call a "memory hog."

Windows loves memory; specifically random-access memory (RAM). Windows XP—the biggest and most complex version to date—is no different. Microsoft's official recommendation that your computer have at least 128MB of RAM available for the operating system is laughable. Computer manufacturers know this, which is why even most budget PCs come equipped with at least 256MB of memory installed at the factory. In our experience, however, Windows XP performs best in a 512MB environment.

If your computer doesn't have as much memory as Windows craves, it will find something to use in its place: your hard drive. Windows will create a virtual memory area on your drive, and it will move files in and out of there just as it would from real memory (using a process called polling). The problem with polling is that your hard disk is a mechanical device, which means it uses moving parts (namely, a spinning disk and several read and

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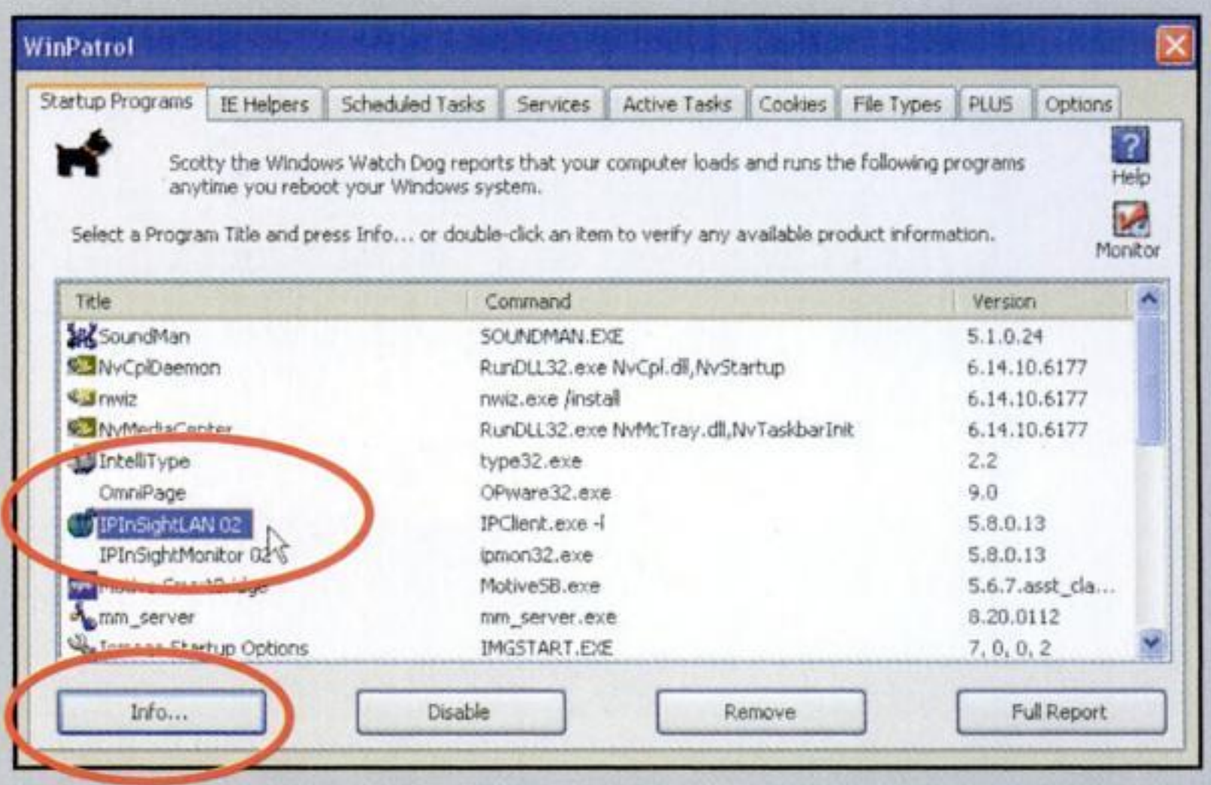
USE WINPATROL TO STREAMLINE STARTUP

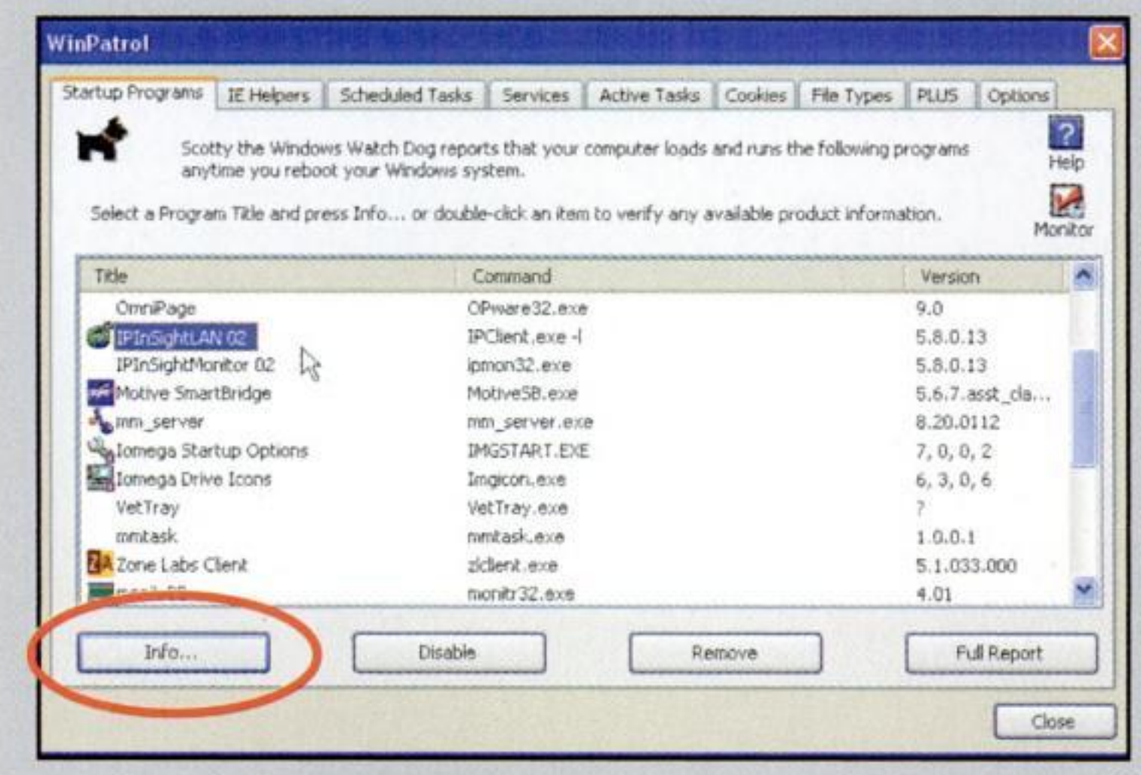
WinPatrol is one of the handiest programs we've ever encountered. We've included the free version on the disc accompanying this issue, so you can check it out. The pay version ($19.95 for a lifetime license) is even better, if for no other reason than it can identify all of those "mystery" programs that automatically start running when your computer starts.

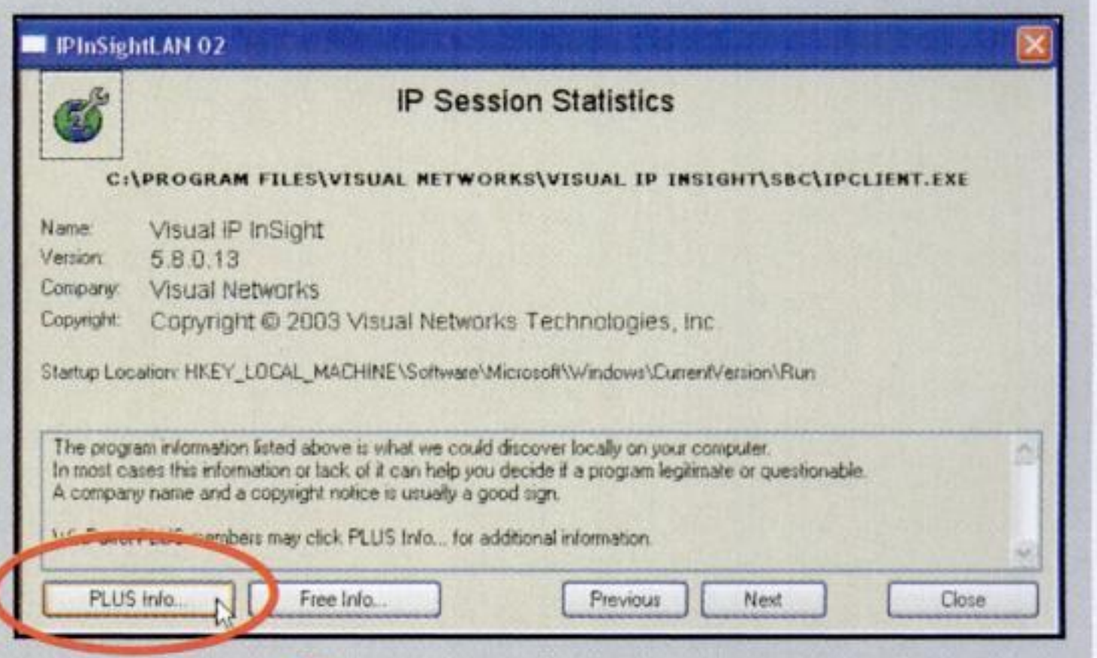
Once you've installed the program, double-click on the Scotty-dog icon in the notification area of the Taskbar (right-hand side) and follow these steps.

1 Click on the Startup Programs tab and review the list of programs that launch automatically each time you start your PC. Many of these programs will be essential, but this is a prime opportunity to catch potentially harmful spyware or to just prune away unnecessary programs. If you're curious about what any program does, select it and then click on the Info button.



2 The Info window will display the basic information WinPatrol can find about this application, including the company that created it, the version number, and even its location in the Windows Registry. Click on the Free Info button and you can check it against the "Most UnWanted" list of software on WinPatrol's website.




IPInSightLAN 02
IP Session Statistics
C:\PROGRAM FILES\VISUAL NETWORKS\VISUAL IP INSIGHT\SBC\IPCLIENT.EXE
Name: Visual IP InSight
Version: 5.8.0.13
Company: Visual Networks
Copyright: Copyright © 2003 Visual Networks Technologies, Inc
Startup Location: HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Run
The program information listed above is what we could discover locally on your computer.
In most cases this information or lack of it can help you decide if a program legitimate or questionable.
A company name and a copyright notice is usually a good sign.
PLUS Info...
Free Info...
Previous
Next
Close

3 If you've purchased a WinPatrol Plus license, you can click on the Plus Info button. This will take you to a detailed description of the program and specific recommendations on WinPatrol's website as to what you should do about it. In this case, we discovered what could be considered a spyware program.

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write heads) to store and retrieve data. This mechanical nature makes your hard drive several orders of magnitude slower than RAM (which has no moving parts).

Beefing up your computer with more memory is one obvious solution, but here's how you can tell if this will make a difference. Next time you're using your PC, keep a close eye on the hard-drive activity light on the front panel (look for the red or green LED on the front panel, next to a barrel-shaped icon). If the light flickers madly every time you do something (loading or saving files doesn't count, obviously), Windows is polling and your PC needs more memory. Continue to monitor your hard-drive activity after the upgrade. Depending on the applications you use most often, your PC might need still more memory. Editing digital photos or video and playing games, for example, are much more memory-intensive than applications such as word processors and web browsers.

Do you ever get tired or frustrated with Windows' menus-within-menus-within-menus user interface? Check out Winuscon 1.56 for a distinct change of pace.

Organization: Who Needs It?

Windows XP can be overly obsessive when it comes to organizing your computer. Using a feature called "Indexing Service," it will keep a record of all the files on your computer, so they can be retrieved as quickly as possible. It requires just a fraction of a second to index a single file, but as the number of files on your PC adds up, so do those fractions of seconds. After a while, the time consumption can become significant.

Having Windows XP check your disk for problems by choosing both these options will slow down the defrag process, but you'll be much better off in the long run if there is a problem.

Indexing slows things down more when you're saving files than when you're retrieving them, but the delay can be noticeable during either operation. Unless you're constantly searching your hard drive for specific files, turning off indexing will speed up your computer for other uses.

To disable indexing, double-click on My Computer, right-click on the chosen drive, and then choose Properties from the pop-out menu. Look in the bottom of the Properties window and remove the checkmark next to the item that reads "Allow Indexing Service to index this disk for fast file searching." A message will appear asking if you want this change to apply to the hard drive's root directory only ("C:\" if you're working with your PC's primary hard drive), or to all the subfolders and files on that hard drive. The second choice will be marked by default, and that's the choice you should make. Click on the OK button. Windows will run through some gymnastics as it changes the attributes of the files on your hard drive. You can close the Properties windows when it's finished.

Disk Cleanup

Windows XP can be as untidy about cleaning up after itself as it is about indexing the files on your hard drive. And no matter how fastidious you are about housekeeping, there will always be a lot of unneeded files on your hard drive. Here's how to get rid of them.

Click on the Start menu and choose All Programs. Point to Accessories, System Tools, and then choose Disk Cleanup. If your computer has more than one hard drive, Disk Cleanup will ask which one you wish to work with; otherwise, it will analyze your C: drive and then present a list of files that Windows thinks you can do without.

This is not an exact science, by any means. Windows is only making suggestions here, and it's up to you to decide whether or not it's on target. Two file types you can usually be sure about discarding will have checkmarks next to

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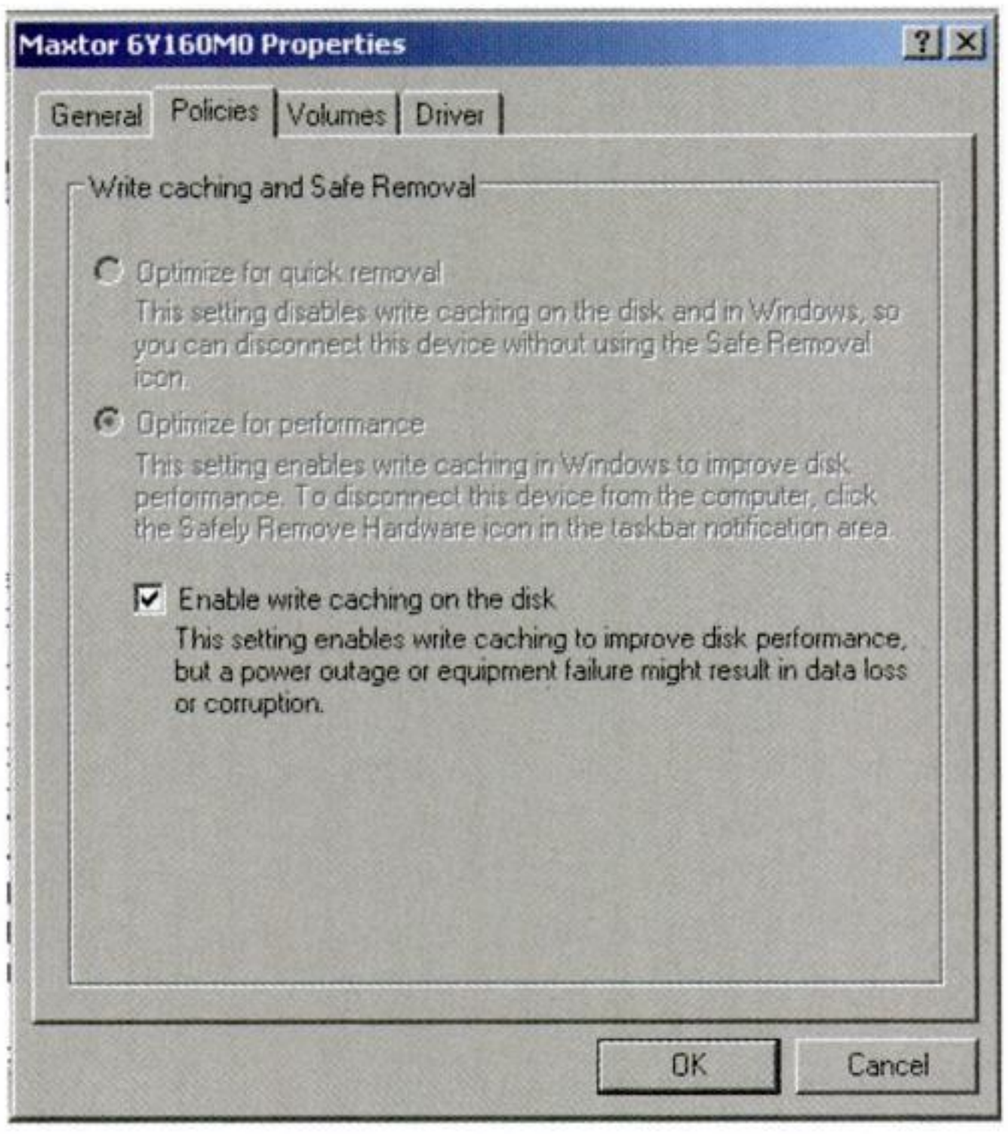
Maxtor 6Y160M0 Properties
General
Policies
Volumes
Driver
Write caching and Safe Removal
Optimize for quick removal
This setting disables write caching on the disk and in Windows, so you can disconnect this device without using the Safe Removal icon.
Optimize for performance
This setting enables write caching in Windows to improve disk performance. To disconnect this device from the computer, click the Safely Remove Hardware icon in the taskbar notification area.
Enable write caching on the disk
This setting enables write caching to improve disk performance, but a power outage or equipment failure might result in data loss or corruption.
OK
Cancel

Enabling write caching on your hard drive is one way to speed up your computer, but if your system is short on memory, it can have just the opposite effect.

them by default: Downloaded Program Files and Temporary Internet Files. The former are small applications that are automatically downloaded to your computer when you visit certain websites; the latter are web pages that you've viewed recently.

We'd also encourage you to put a checkmark next to "Temporary Files" (programs sometimes store files here temporarily, and they should be automatically removed when the program shuts down).

Next, look at the amount of data identified as "Web/Client Publisher Files." These are Internet files that are stored on your hard drive so that they can be displayed quickly if you go back to the web pages that originally created them (as opposed to downloading them all over again each time you visit). If these files amount to just a few tens of thousands of kilobytes (KB), leave them there: The storage space they consume is negligible compared to the speed boost they'll provide. If hundreds of thousands of kilobytes, on the other hand, your computer can download them anew much faster than it can search through a long list of file names.

Once you've purged the junk files from your computer, go back and look at junk programs that you no longer use. Windows XP installs a number of its own components that you might not ever use, either because you've found better alternatives or because you just don't care about them.

With the Disk Cleanup window still open, click on the More Options tab. Click on the Clean Up button in Windows Components, the first of the three boxes you see here. The Windows Components Wizard will appear, displaying the component and how much hard-drive space it consumes. Some categories, such as "Accessories and Utilities," will contain more than one component. In those cases, selecting the component and then clicking on the Details button will reveal additional information.

"Accessories and Utilities," for example, contains everything from the program MS Paint to Microsoft's Minesweeper, Solitaire, and other simple games. If you occasionally play Solitaire but you've never played Minesweeper, you can remove one but leave the other. Alternatively, you can just as easily remove all these games with a few clicks of the mouse. As long as you have your original Windows disc, you can easily reinstall these programs later.

Clicking on the Clean Up button in the second category, Installed Programs, simply launches the Add or Remove Programs control panel. If you have programs installed on your computer that you no longer have any use for, uninstalling them will free up additional storage space. If you find yourself using Windows' System Restore Point frequently, clicking on the Clean Up button in this area of the Disk Cleanup window will delete all but the most recent restore point. Be careful with this option. The reason you create restore points is so that you can return to a stable environment should something go awry. If, on the other hand, you haven't installed any new programs or made any other major system changes in several months, you're unlikely to lose anything important by deleting old restore points.

Defrag your Hard Drive

The space vacated by removing files, programs, and restore points is re-used when you store a new file or install a new program. If that new file or program is larger than the available space, however, only part of it will be stored there—the rest will broken up and stored in the next available space. Even if these spaces are close together, the resulting fragmentation of your hard drive will slow down both its reading and writing capabilities. The solution, as you've probably guessed, is to defragment your hard drive. Windows XP makes this operation easy to accomplish, and we've already shown you how to do it on page 39. We're mentioning it again here so there's no way you can miss how important we feel this proceedure is.

Hard-Drive Cache

Data must flow into and out of your hard drive through a relatively narrow pipeline, so your computer relies on two memory caches to reduce the amount of time it spends waiting for read (data flowing out of your hard drive) and write (data flowing into your hard drive) actions. A cache is like the storm drain at the end of your street. A storm drain is a large vault connected to a much smaller drain pipe. The vault can hold much more water than the drain pipe can, so water collects in the vault and feeds water to the drain pipe as fast as the pipe can take it. This prevents the water from collecting in the gutters and flooding the street.

A hard-drive's primary cache—anywhere from 2MB to 16MB of memory on the latest models—is located on the drive itself. If you let it, Windows XP will claim part of your system memory to create a second cache. A larger secondary cache is a good idea—unless your computer only has just enough system memory to run Windows effectively. In this situation, taking away some of your system memory and dedicating it to creating a secondary hard-drive cache can render your computer slow or even unstable. You also need to remember that if your computer loses power or otherwise fails, any data stored in either cache while it's being written to the drive will disappear. The larger the cache, the more data you stand to lose.

Windows is a smart operating system, so it might have already enabled cach-

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ing. To verify this—and change it, if you'd like—click on the Start menu and choose Control Panel. Click on Performance and Maintenance and then System. When the System Properties window opens, click on the Hardware tab and then the Device Manager button. Click on the plus symbol next to Disk Drives to expose the list of disk drives connected to your computer. (Note: If your computer is equipped with more than one hard drive, you'll need to repeat the next step for each drive.)

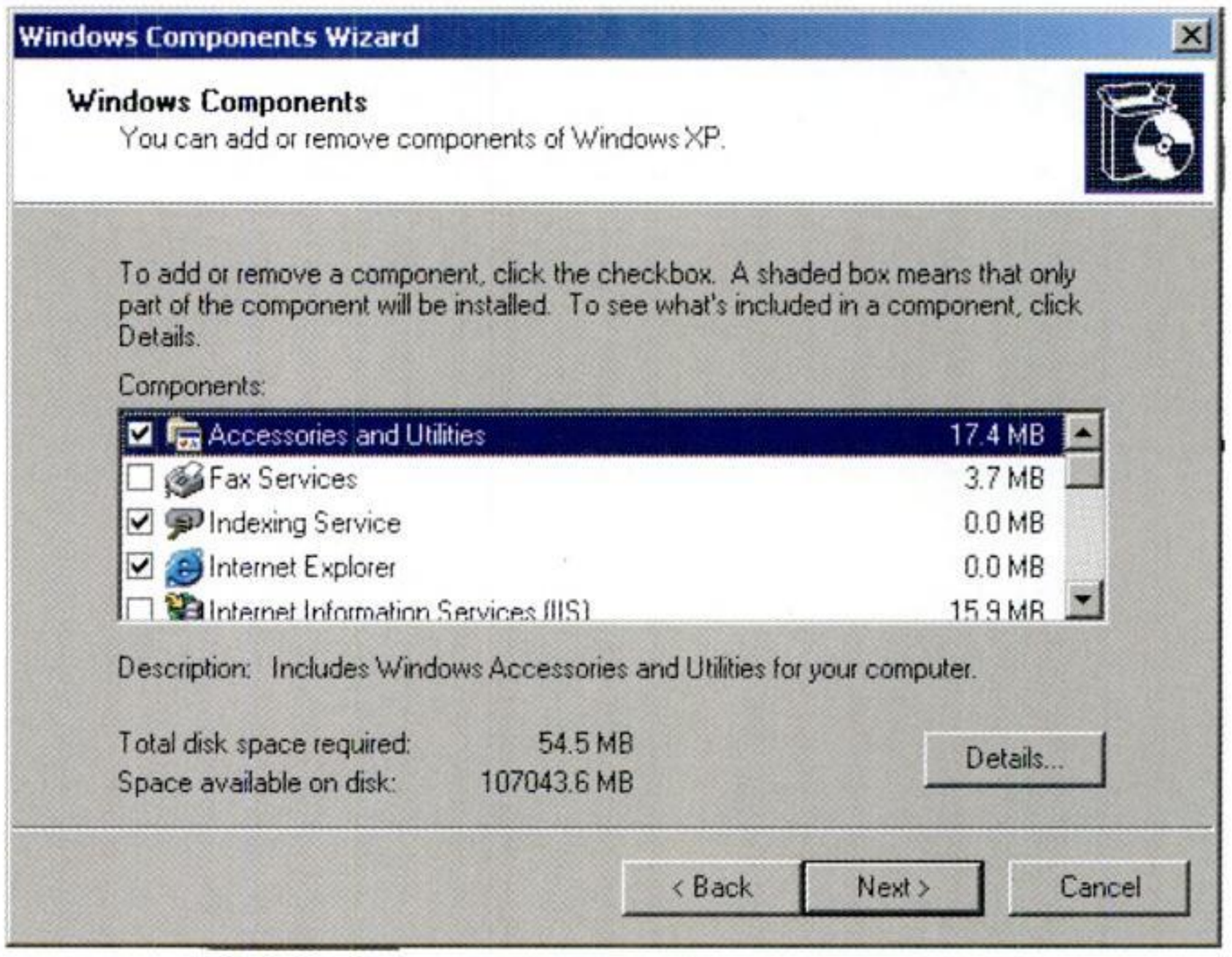
There are two ways that data can be transferred to and from your hard drive—DMA (direct memory access) and PIO (programmed input/output)—and the method used can have a significant impact on Windows' performance. The important thing to remember is that DMA is fast and PIO is slow. In fact, PIO is so slow that a hard drive using this mode would have difficulty capturing video, and a DVD drive using it would have a hard time playing video.

To verify which setting your drives are using, go back to the Device Manager window again and locate the entry that reads "IDE ATA/ATAPI Controllers". Click on the plus sign next to this to expose the list of controllers. The item labeled "Primary IDE Channel" is typically where your hard drive(s) would be connected; the item labeled "Secondary IDE Channel" would typically be where your optical drive(s) (CD, CD-R, DVD, etc.) are connected.

Right-click on the Primary controller, choose properties from the pop-out menu, and click on the Advanced Settings tab in the Properties window. You'll see two boxes, labeled Device 0 and Device 1. Device 0 is your hard drive. (If your computer is outfitted with two hard drives, the second would be Device 1.) If the entry in the box labeled "Current Transfer Mode" reads "DMA if available," you don't need to do anything else. If it reads "PIO Only," click on the arrow button and choose the DMA option. Do the same for Device 1 if you have two hard drives. Click OK and repeat these steps for your optical drive(s) on the secondary IDE channel.

Cleaning the Registry

Everything we've done to tweak Windows so far has been on the surface of the operating system—kinda like rearranging the furniture to improve the traffic flow in your living room. To really clean things up and make your system run faster, you need to go deep into the heart of Windows XP: The System Registry.


Windows Components Wizard
Windows Components
You can add or remove components of Windows XP.
To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.
Components:
Accessories and Utilities 17.4 MB
Fax Services 3.7 MB
Indexing Service 0.0 MB
Internet Explorer 0.0 MB
Internet Information Services (IIS) 15.9 MB
Description: Includes Windows Accessories and Utilities for your computer.
Total disk space required: 54.5 MB
Space available on disk: 107043.6 MB
Details...
< Back
Next >
Cancel

Use the Add or Remove Windows Component tool regularly to avoid unmanageable clutter.

The Registry is a database containing detailed information about exactly how your computer is configured. It knows everything from the type of CPU your PC is based on to all the software that's installed on it. It knows the identity and personal preferences of each person assigned a unique log-on ID, it knows which types of documents each program can create, it knows what brand of printer is connected, and much more. Windows refers to the Registry constantly all the while you're using it.

As you might expect, if something bad happens to the Registry, it can spell all kinds of trouble for your PC and the data stored on it. You should be very careful when mucking around with the Registry. If you ignore the Registry, however, you run an equal risk that your PC will develop problems. If you don't clean it up every once in a while, the Registry can become clogged with the debris of programs you've long since uninstalled, choices you've made and subsequently changed, and plenty of other flotsam left behind from daily use of your PC.

Fortunately, we don't need to learn enough about the Registry to get down and dirty with it while simultaneously giving it the kid-glove treatment. Instead, we can rely on the expertise of third-party software developers who readily understand its complex and sensitive nature.

We've even included the trial version of one such product, Iolo Technologies' System Mechanic 5, on this issue's disc for you to try. Refer to the sidebar on the next page for a step-by-step guide to using this program.

Nits and Bits

There are a number of other housekeeping chores that will clean up Windows. If your desktop is littered with dozens of icons and shortcuts (you can identify these by the curved arrow inside a box), move them to the Recycle Bin—and then empty it.

Spyware hiding out on your PC can also slow it down. Use a program such as System Mechanic or Spybot Search & Destroy to hunt down and remove key loggers (which record all your keystrokes in an effort to steal log-in IDs and passwords), adware (which can bombard you with unsolicited advertisements), and other undesirable programs that invade your privacy. Running anti-virus software offers little protection against spyware.

Lastly, be judicious about the programs that you allow to take up residence on your PC. If you discover you're no longer actively using a program, consider uninstalling it. The fewer things Windows needs to keep track of, the happier you'll be with your PC overall.

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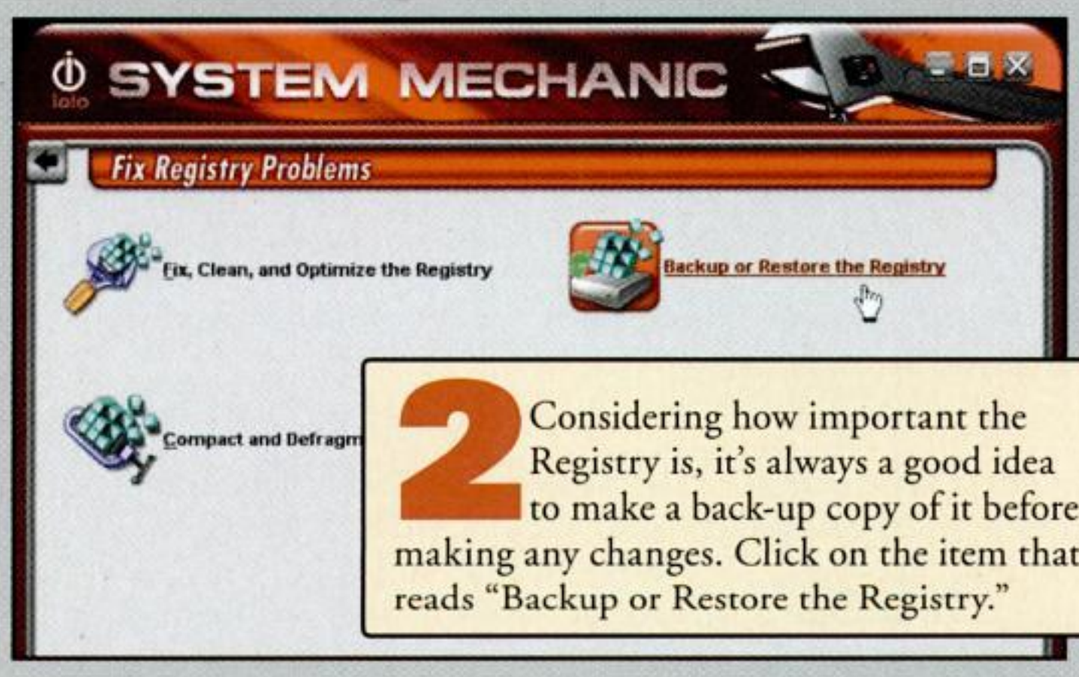
FIX THE WINDOWS REGISTRY WITH SYSTEM MECHANIC 5

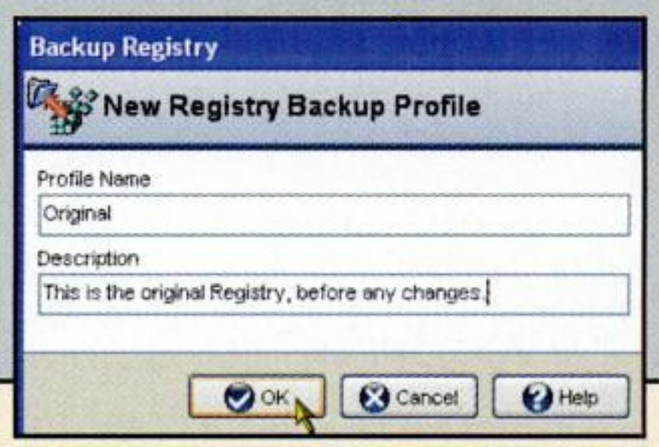
As we've noted, problems inside the System Registry can cause all kinds of Windows XP performance problems. Mucking around with the Registry, however, can be dangerous—if you make an error, you could easily destabilize your PC. Iolo Technologies' System Mechanic 5 not only makes Registry changes easier, it makes them safer, too. You'll find the 30-day evaluation version on the disc accompanying this issue. Install the software, and we'll show you how to use its excellent Registry tool.

When you're finished, exit System Mechanic and restart your computer. Everything should run smoothly; if it doesn't, use the program to restore the original Registry from the backup copy that you'll make below. ■

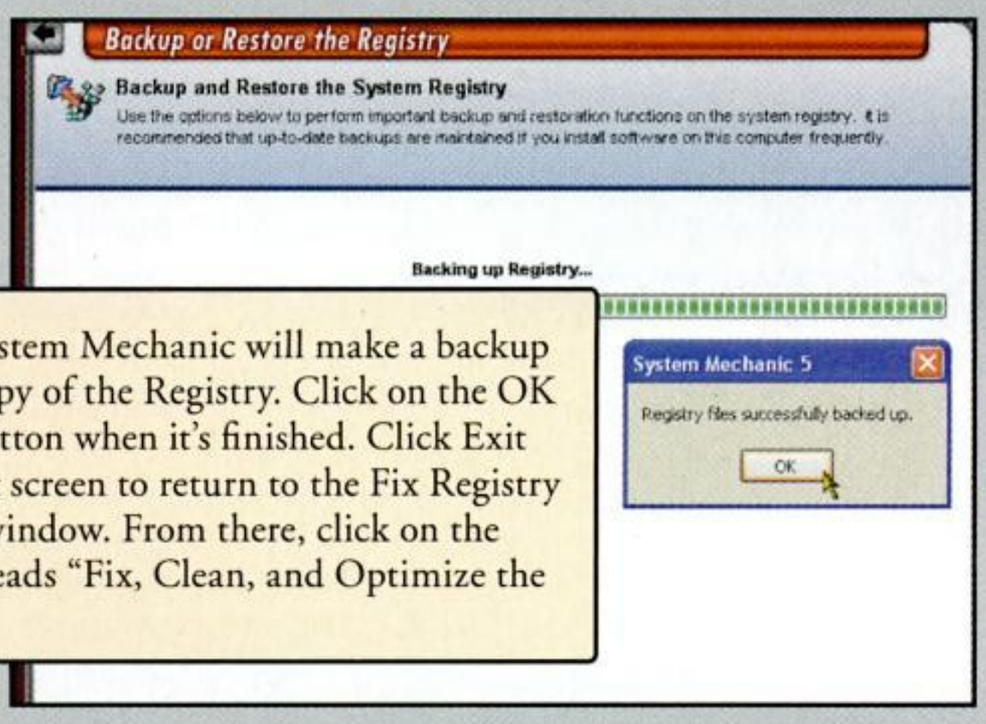
1 Launch the program, click on the Fix button (in the left-hand column), and then click on the item that reads "Fix Registry Problems."



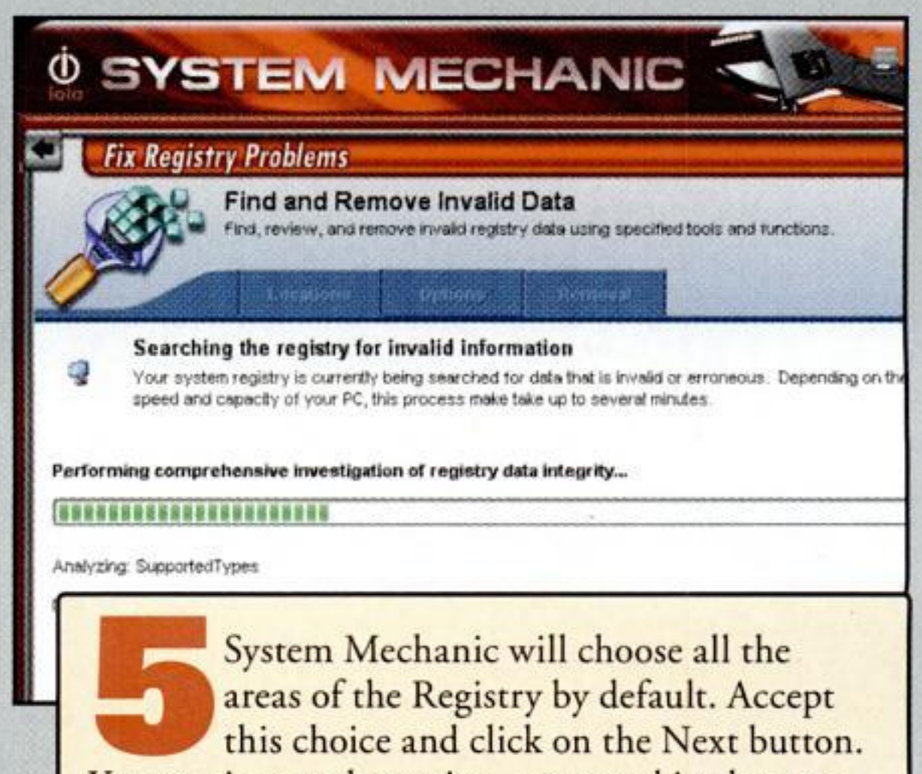
2 Considering how important the Registry is, it's always a good idea to make a back-up copy of it before making any changes. Click on the item that reads "Backup or Restore the Registry."



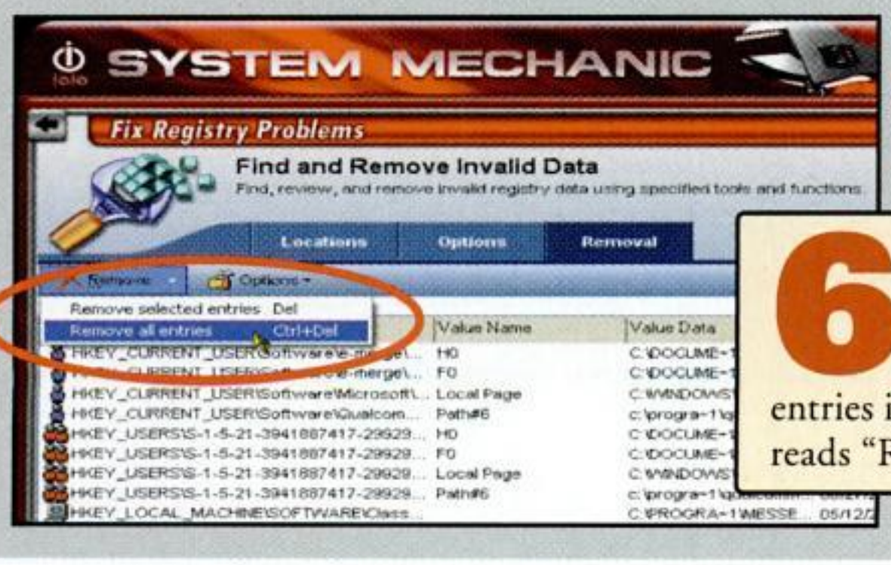
3 Click on the Backup Now button. Assign the Registry backup a profile name and a meaningful description, and then click on the OK button.


Backup or Restore the Registry
Backup and Restore the System Registry
Use the options below to perform important backup and restoration functions on the system registry. It is recommended that up-to-date backups are maintained if you install software on this computer frequently.
Backing up Registry...
System Mechanic 5
Registry files successfully backed up.
OK

4 System Mechanic will make a backup copy of the Registry. Click on the OK button when it's finished. Click Exit on the next screen to return to the Fix Registry Problems window. From there, click on the item that reads "Fix, Clean, and Optimize the Registry."


SYSTEM MECHANIC
Fix Registry Problems
Find and Remove Invalid Data
Find, review, and remove invalid registry data using specified tools and functions.
Searching the registry for invalid information
Your system registry is currently being searched for data that is invalid or erroneous. Depending on the speed and capacity of your PC, this process make take up to several minutes.
Performing comprehensive investigation of registry data integrity...
Analyzing: SupportedTypes

5 System Mechanic will choose all the areas of the Registry by default. Accept this choice and click on the Next button. You can ignore the option, presented in the next window, to omit particular terms from the search. Click on the Removal tab.



6 System Mechanic will begin its analysis of the Registry. This could take some time, particularly if you have an older PC. When it's finished, it will present its search results. If it finds any invalid entries in your Registry, click on the Remove menu and choose the item that reads "Remove all entries."

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ablaze with weapons other boards can't handle.

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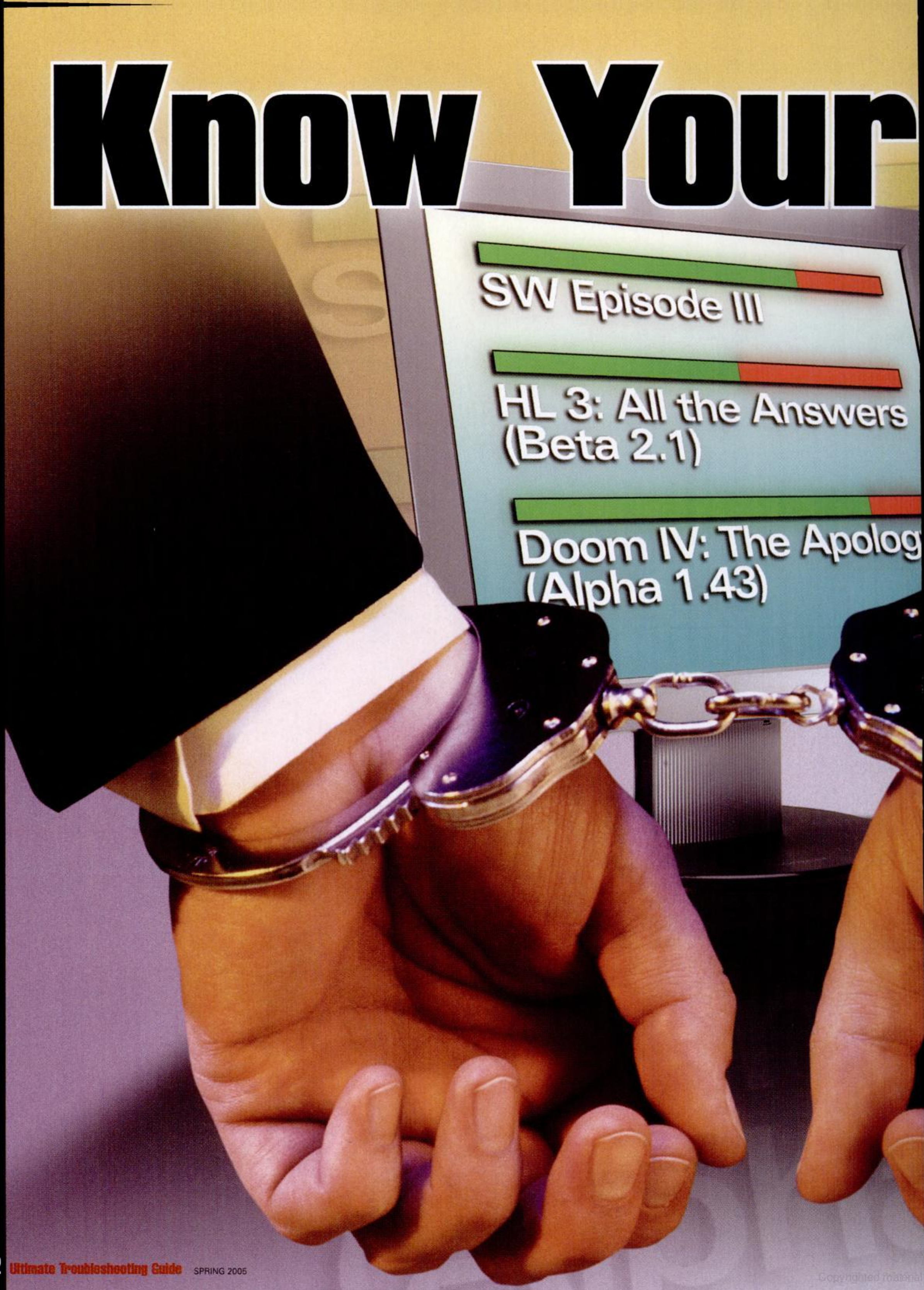
Know Your



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PC Rights

by Jason Compton

Subpoenas from movie studios. Lawsuit threats from the music industry. The Digital Millennium Copyright Act. It's tough to figure out what you can and can't do these days with your own digital media. *Maximum PC* consults legal experts to help sort it all out. This is one case where it's definitely not best to try to troubleshoot problems after they happen. Know your rights in a DMCA world.

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Know Your PC Rights

Am I liable if my PC is hijacked by a Trojan and used to commit a crime? If a backdoor program infects your PC and starts running a process in the background to relay fraudulent spam or launch a DDOS attack on the Pentagon, no, you are not liable. "The key element every first-year law student learns is *mens rea*—intent. Is there intent on the part of the person who has the hijacked PC?" says **Ross Kodner, president of MicroLaw Inc.** Unless you're consciously developing or beta-testing Trojans, you had no intent to wreak digital havoc.

Remember, though, that if someone comes after you, they will be armed with IP logs saying that your PC did such and such, at such and such a time. Your job will be to establish that while, yes, the computer was doing those things, you had no knowledge of its actions nor did you intend for it to behave in that manner. "Giving full access to the equipment so that others could inspect it could reveal the source of the takeover. Cooperation goes a long way," says **Richard A. Epstein, professor of law at University of Chicago.**

Presuming you clearly establish that you were an unwitting participant, you could still be found negligent of *something* if someone chose to diligently pursue the case, particularly if you could be shown to engage in high-risk activity with your PC such as downloading software from dubious sources or not running a virus scanner. **Eben Moglen, professor of law at Columbia University Law School and general counsel for the Free Software Foundation,** advocates that PC owners push their homeowner's insurance carriers to protect them from PC mishaps just as auto insurers protect their cars. "Insurers have to decide what the actuarial numbers are. It should be an insurable risk," he says.

I ripped a movie from a commercial DVD and placed it in my Share folder so I could access it through the wireless network in my house. But this made it accessible to others on the web. If they download it, have I committed a crime? First things first—that's some pretty sloppy LAN management, pal. Internal shared drives are for internal shares. Your external share folder is for P2P. Keep them separate, and keep safe.

Assuming you made such a slip, however, bear in mind that you may have committed a crime just by ripping the movie in the first place. The DMCA doesn't want to let you decrypt and rip DVDs. By the letter of the law, "taking the DVD out from its protective cover is criminal, and putting it where you know others will want it is a second offense," explains Epstein.

Kodner warns as well that as publications ranging from *Maximum PC* to the *Wall Street Journal* hammer home concepts of network security month in and month out, courts may increasingly find that "reasonable persons" shouldn't make these sorts of dumb mistakes and could, in fact, be found liable in a civil trial. If you're running P2P software, it could be reasonably assumed that you know how your share folder works. On the other hand, if the DVD image is being grabbed by people driving by and muscling into your wireless LAN, then they are likely in the wrong and you are in the clear.

> "Moglen advocates that PC owners push their homeowner's insurance carriers to protect them from PC mishaps just as auto insurers protect their cars."

Serving up the movie is quite likely against the law as well if you knew it could happen. "Under the 'contributory infringement' doctrine, you can be held liable for copyright infringement if you have knowledge of someone's infringing activity and you either induce or materially contribute to such infringing activity," says **John F. Delaney, partner at the law firm of Morrison and Foerster LLP.**

"If your intent was to make it available for yourself, if you're just doing your own thing, I really don't think you're going to violate the law. But that may not keep the movie or music industry from suing you because they may want to intimidate people by the mere threat," says **Jason Schultz, staff attorney for the Electronic Freedom Foundation.** "If that happens, call the EFF."

OK, once and for all, does the Digital Millennium Copyright Act (DMCA) make it illegal for me to make a backup of my game CD, audio CD, or movie on DVD? Sorry, but the answer is still not cut and dried. Traditional copyright law says that backups for personal use are legitimate and protected. That's the Fair Use provision at work for you.

The problem is that the DMCA, as written, says that cracking copy protection in order to make a backup is not legitimate. "Making a backup copy itself isn't illegal. Cracking the encryption system to do so may be," says **Mark A. Lemley, professor of law at Boalt Hall School of Law, UC Berkeley.**

So most audio CDs and many game CDs are still in the clear. DVDs are always protected, however, and an increasing number of audio and game CDs are as well. "For DVDs, no one really knows" what the law says about backups because of conflicting court rulings," says Schultz. "It may have to go all the way to the Supreme Court."

Because the DMCA's strict language contradicts Fair Use provisions already on the books and declares fundamentally legitimate tasks like backing up software and playing a DVD on a Linux PC to be wrong, legal experts believe the current chilly environment for consumers, where they are implicitly threatened with lawsuits for behaving like responsible power users, can't survive. "The inevitability is that court interpretation is going to loosen [the DMCA] to make it practical," says Kodner.

Moglen is even more succinct. "There are individuals in society trying to frighten customers," he says. "Just tell them to drop dead."

I popped a wireless card into my laptop, and logged into an unsecured wireless network, probably from my next-door

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neighbor's house. Is it a crime for me to surf this way?

That depends. Your neighbor might be the type who leaves coolers of cold drinks outside on a hot day for the neighborhood, and he's told the block that the same generosity extends to his WLAN. He might run a neighborhood hotspot, as many people do on the Boingo network, or post on wireless LAN enthusiast sites. In this case, siphon signal to the eyeballs.

If, on the other hand, you have not been given permission, you're likely committing a crime. "You are responsible just as if you used his telephone wire [which would in fact be the case if your neighbor were on DSL]. Nothing unique here," says Epstein.

If your neighbor's on a cable modem, anti–cable-stealing regulations could be brought to bear. "If I were a prosecutor, that would be the avenue I would be exploring," says Kodner.

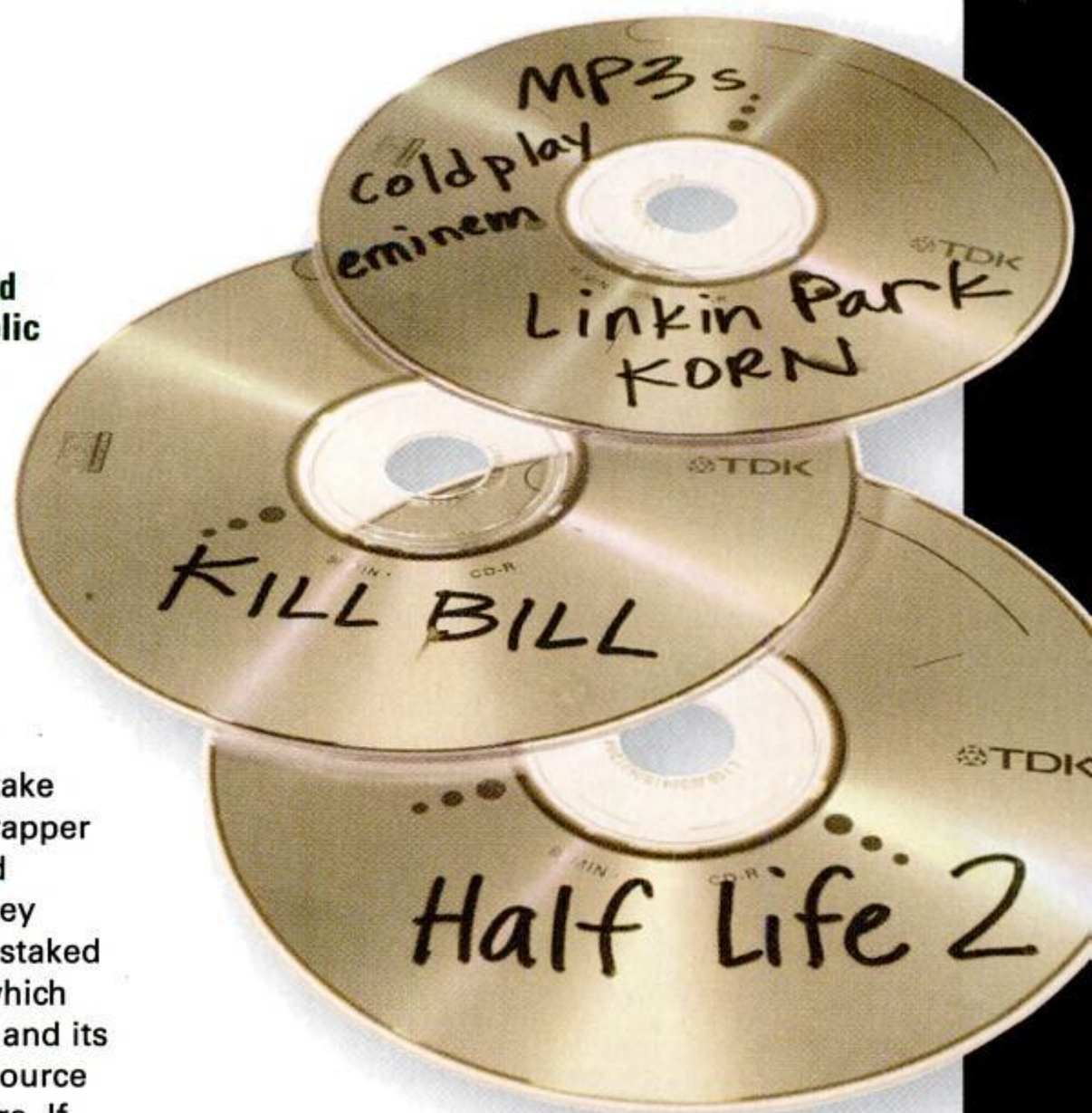
All that said, there is precious little case history establishing where poor form ends and legal wrong begins. In February 2003, Stefan Puffer was tried on computer crimes charges stemming from his "wardriving" exploits accessing government and commercial wireless LANs. The jury promptly acquitted Puffer because it was not proven that he was intentionally doing harm, especially given he was busy demonstrating to a reporter the security flaws in unprotected WLANs. Deliberately seeking out another person's WLAN and hogging bandwidth all day would likely be a different story. While the airwaves may be shared, hopping on someone else's WLAN means you are using a router and broadband connection they pay for expressly for their own personal use. It's a digital trespass, plain and simple.

I wrote a piece of software and released it under the GNU Public License. Someone took my software, added some features, and released it for sale—without the source, without my name, without the GNU Public License! How can I put the smack down on this boob?

The GPL does a lot of things. One of the things it does is expressly allow someone to take your program, put a shiny wrapper on it, and sell it for a hundred million dollars—as long as they preserve the rights you have staked out for yourself in the GPL, which include keeping the program and its direct descendants an open-source creation for now and evermore. If your copyright and your source have disappeared, then you have a clear case of infringement and can sue. There's a good reason that this rarely happens, though—the GPL is so intricately written that it's very difficult to contest.

"More often, you just need to send a letter or e-mail [to the boob] saying 'I own you,'" says Schultz. "They think they will get away with it and no one will notice, but once you shine the spotlight on them, they realize they have to do the GPL rights."

For the authoritative answer, take it from Mr. Moglen and the Free Software Foundation, which wrote the GPL in the first place. "Bring an action for infringement of copyright. Permission extends only to distributing under the terms of this license... so if you turn it into a proprietary program, at that point you're infringing copyright," he says. If you think you need additional help enforcing the right of your software to be free, you can assign your copyright to the FSF, which will actively pursue infringers.



I downloaded some music from iTunes, but I don't have an iPod. If I burn the track to a CD, rip it, and put it on a different player, could it be construed as stealing?

No, this is just as legitimate as ripping a track from a CD you purchased. You did, after all, pay for the right to play the music, and thus far the law protects your right to rip, spindle, fold, and mutilate purchased music into the format of your choice for your own recreational use. "The only question is whether you would be violating any part of Apple's license, and I can't see anything [in the license] that prohibits you as long as it is personal and not commercial use," says Schultz.

"Indeed, there is some reason to believe that if the sale only allows you to play on [Apple products], it would run afoul of antitrust laws by precluding competition in the player market," adds Epstein.

Since DVDXCopy was found to be in violation of the law, does this make me an, uh, retroactive criminal?

Don't move to Canada just yet. You won't be going to jail for simply having been on DVDXCopy's registered user list, if that's what you mean. But if Fair Use provisions of copyright law are weakened further, then it is very possible you will suddenly find yourself in possession of contraband materials and forbidden fruit.

Still, DVDXCopy was indeed "found to violate the DMCA, [so]

> **"If you're running P2P software, it could be reasonably assumed that you know how your share folder works."**

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yes, technically it could mean that everyone who used it violated the DMCA," says Schultz. Each and every DVD-R in your house could be a separate violation if someone wanted to get really nasty about it. Normally laws cannot punish behavior that took place before they were passed, but in this case the DMCA existed before *DVDXCopy*, so it would not be a true retroactive punishment. That said, the lawsuit against 321 Studios, author of *DVDXCopy*, was more about getting the product off the shelves than about punishing users.

Kodner thinks the scenario will play out much like the criminalization of certain drugs, like cocaine. Public notice will be given requiring people to dispose of the illicit material during a grace period, after which possession and further manufacture will be a crime. Reports that the Motion Picture Association of America's (MPAA) Jack Valenti plans to rent a U-Haul and do doorstep pickups of your DVD-R spindles could not be verified at press time.

Is it legal for me to use a software program to record the audio track from a DVD movie so I can listen to it with a portable player?

You're swimming with the DMCA sharks again. Fair Use says yes, but the DMCA says that anything that messes with DVD content is a potential problem, because the DMCA is so picky about circumventing encryption and copy protection, which you have to do in order to get at the DVD's audio (unless you use the analog line-out jack to record the soundtrack, which doesn't involve decryption). "The process of getting it could violate the DMCA, but if you legitimately bought the DVD, you have every right to listen to it on a portable player, be it soundtrack or dialogue, under copyright law," says Schultz.

"What the DMCA does is create a paradigm shift in thinking—you presume that what you're doing is wrong rather than presuming that what you're doing is OK until someone tells you it's wrong," says Kodner. No test cases have hit the books for this problem yet, though. Prosecutors and law firms don't waste their time with people who have extensive ripped libraries of their own material; they go after people who are swapping with others. So, again, the law is in conflict and the courts are so far silent.

I know buying pharmaceuticals on the Internet without a prescription is sketchy and dangerous. But if I do it, who is committing the crime, me or the pharmacist?

Finally knuckled under to that "generic Viagra delivered from India!" spam, huh? Don't worry, it happens to the best of us.

> "What the DMCA does is create a paradigm shift in thinking—you presume that what you're doing is wrong rather than presuming that what you're doing is OK until someone tells you it's wrong."

The pharmacist is certainly committing a crime, although aside from blocking shipments at the border, there may not be much the government can do about it. "The institution will feel the brunt of any sanctions. The question of whether [the seller] is subject to our jurisdiction is controversial, but if he actively solicits business in the States, he will be so subject if we can find him," says Epstein.

You could be in trouble yourself, depending on what you're getting your hands on; and if it appears that you're intentionally flouting the law. Possession and transport of controlled substances is a crime. If you are obtaining dangerous substances like narcotics or drugs expressly not authorized for sale in the U.S., expect some trouble if someone discovers your stash. "If it's made clear from the web site that it is medication not authorized for sale in the U.S., I think there would be responsibility on the part of the purchaser," says Kodner.

My ex guessed my e-mail password, logged on as me, and read my e-mail. Can I bust him/her?

Short answer: Yes. Long answer: Yes, *but*.

Clearly it's a digital trespass, but a criminal act has not taken place unless your ex does a heck of a lot more than reading the love poems from your new sweetheart. "From a civil perspective, you can sue anybody you want, but you're not going to make a case unless you can show actual damages," says Kodner.

"It is a violation of the Computer Fraud and Abuse Act (CFAA) if [the violator does] more than $5,000 in damages. If not, it's probably OK," says Schultz. Because even guessing a password could be considered hacking under the CFAA, the violator could be held liable, but first you'll have to build a case for damages done, and your ex learning that you're recycling the nickname "sugar booger" won't be enough. If the jilted lover used the time to, say, send some e-mails as you to your boss and co-workers telling them that they should rot in hell in various anatomically impossible positions and you get fired as a result, you can show proof of injury. If your ex gets access to your finances and shifts things around maliciously, again, you have some damages. Even time spent inspecting your system for trouble after discovering the intrusion could be rolled into the total.

But if you ask us, you should simply be a little more judicious about your passwords when a former lover moves out. ■

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How To...

A step-by-step guide to tweaking your PC experience

BUILD A BARTPE DISC

It's all you'll need to rescue and repair a recalcitrant computer!

Everyone has been hit by the one-two punch of viruses and spyware. If you run Windows and are connected to the Internet, it's difficult to avoid these problems. Even worse, the latest viruses and spyware programs are designed to be almost impossible to remove. Often, your only option is a complete reformat. Still, there are methods to expunge evil programs from your PC.

One way you can prepare yourself for catastrophe is to create a Bart's Preinstall Environment disc. Named for its creator, Bart Lagerweij, a BartPE disc lets you boot into a familiar GUI from a specially prepared CD-ROM. This means that even if your installation of Windows is hosed, you can gain access to your hard drive and back up valuable documents and files and/or access the Internet.

Booting off a CD is also a great way to scour your hard drive for the most annoying viruses or pesky spyware applets that run on Windows startup and therefore block all attempts at removal. But the very best thing about a *BartPE* disc is its price: free.

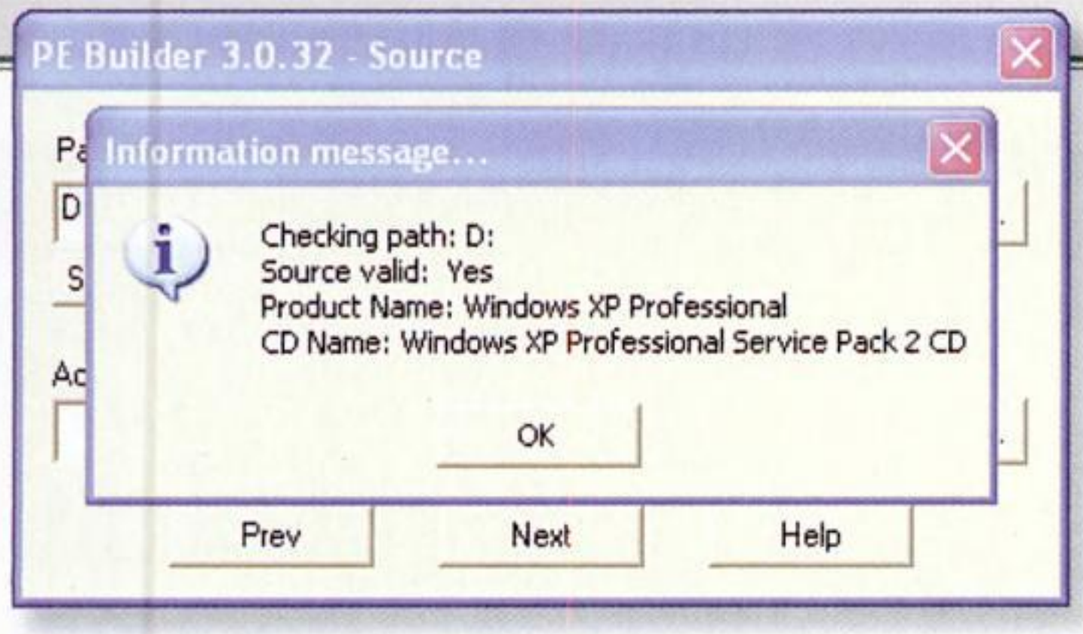
Get your tools together

For this project, you'll need a copy of *PE Builder*, which is available for free at **www.nu2.nu** or on the disc that came with this magazine (the latest version is 3.1.3). You'll also need a copy of Windows XP Home or Pro with Service Pack 1 or 2 slipstreamed into it. If you don't have a slipstreamed version of XP, check out our How-To on page 72. Although the compiled BartPE disc will work on Windows 2000 systems, it *must* be created by a machine running Windows XP or Windows 2003 Server.

You'll also need Internet access to download the dozens of plugins you can add to your BartPE disc—everything from telnet to FTP clients to stripped-down web browsers to free CD burning software to spyware- and virus-removal apps.

Finally, you'll also need a CD-R/RW drive and software that can burn an ISO disc image (we used *Nero* for this project). We recommend that you burn your first BartPE disc as a CD-RW because it may take a couple of tweaks to get it just right.

A BartPE disc will let you troubleshoot a busted copy of Windows better than the tools that Microsoft provides.



***PE Builder* will check your OS disc to make sure you have XP with SP1 or SP2 slipstreamed.**

This is Gold Leader. We're starting our attack run

After you've downloaded *PE Builder*, extract it into its own directory. Once extracted, open the directory and execute pebuilder.exe. Insert your Windows XP disc into an optical drive and point *PE Builder* to it. Hit the "Check" button and *PE Builder* will verify that you have the correct OS version. *PE Builder* works with Windows XP Home and Pro, but only with SP1 or SP2 slipstreamed in. It also works with Windows Server 2003 Web, Standard, and Enterprise editions.

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Make a basic disc

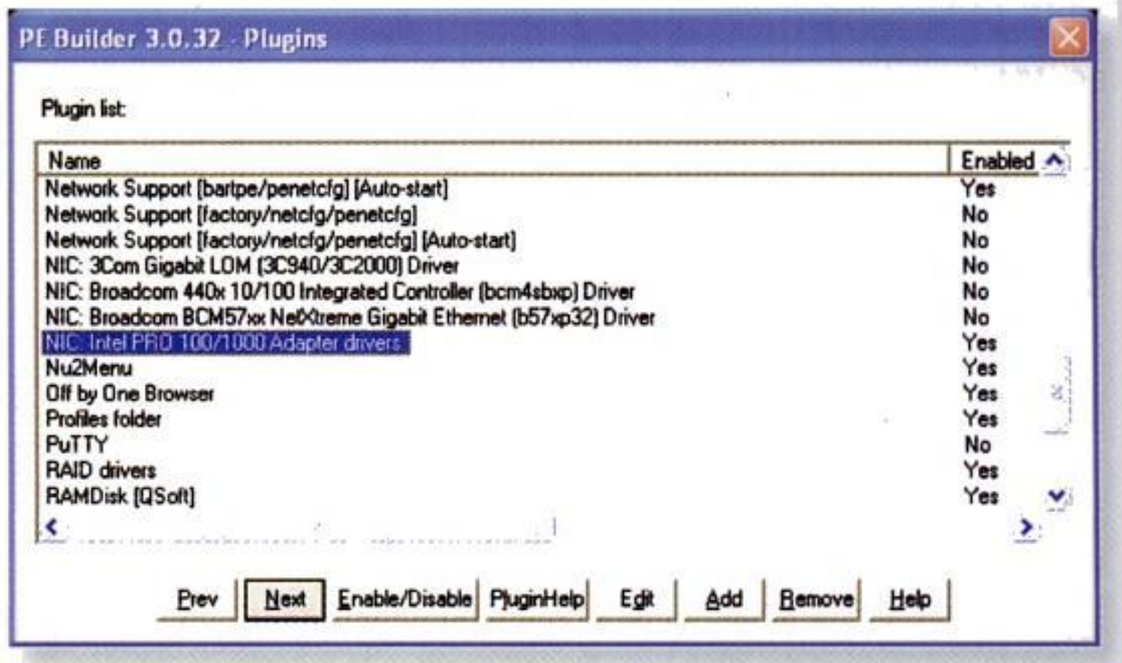
If you don't have the attention span to add drivers or plugins, click "Next" and simply compile your BartPE disc now. Once burned, this CD lets you immediately boot into a BartPE environment and browse the machine using A43—a Windows Explorer equivalent. You can also run a rudimentary Check Disk and gain basic network access. Skip ahead to the step labeled "Burn your Bart PE disc" to finalize your disc. But if you want to add drivers for your RAID or network cards, read on.

Add drivers

The thing that makes a BartPE disc interesting is the ability to customize your disc with drivers for the hardware in your system. For example, some preinstall environments require you to insert a floppy disk with RAID or SATA card drivers every time you boot off the disc. That's a drag! Without drivers and crucial applications, your disc is useless.

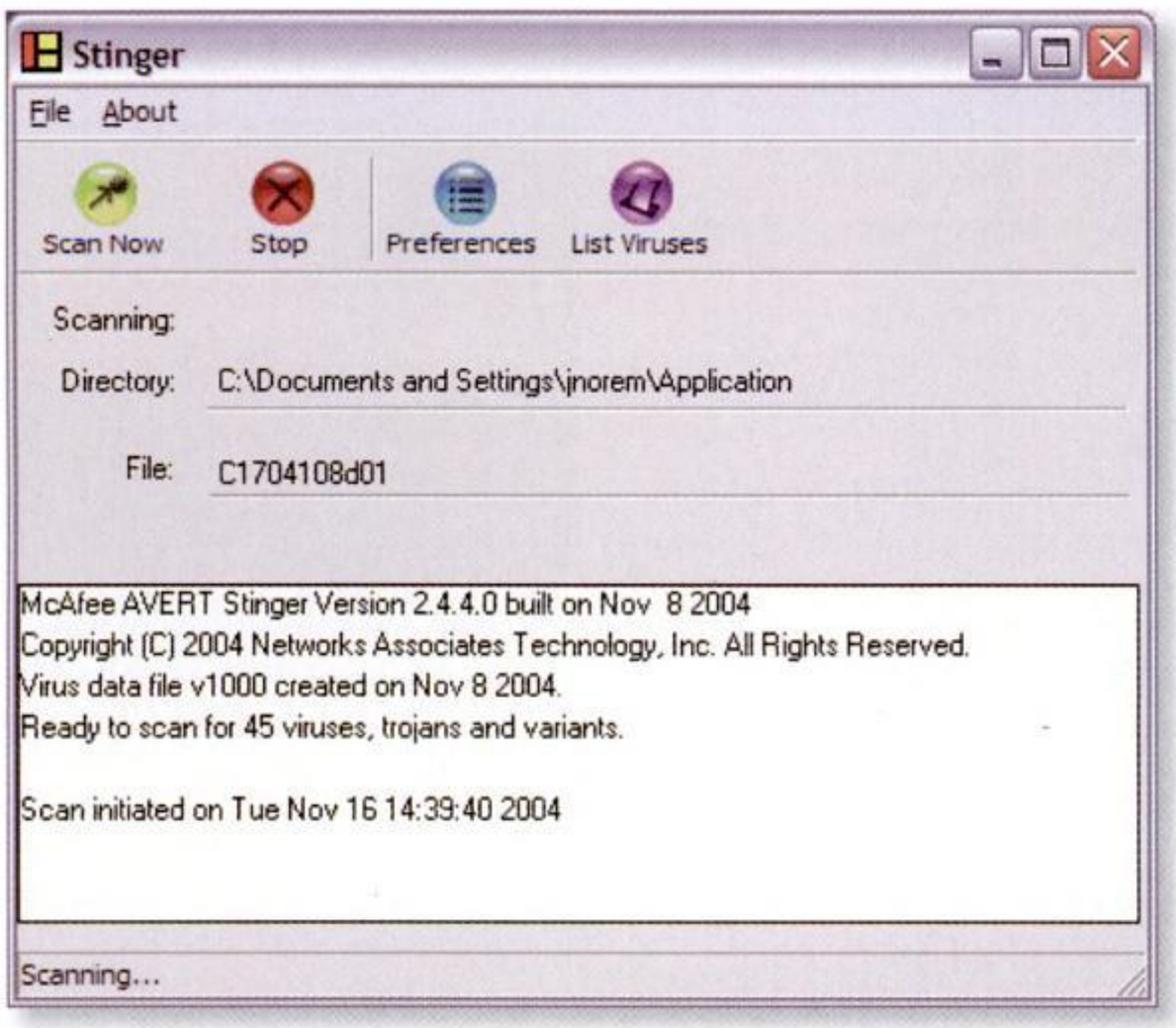
PE Builder supports lots of hardware and dozens of free applications, but these apps and drivers are not included with the *PE Builder* app. To install them you must download the files yourself. Fortunately, the program holds your hand through most of the process. If you didn't skip ahead, *PE Builder* should be displaying a screen that says "Plugins" on the top.

Adding drivers is as easy as clicking the appropriate plugin and following the install procedures. Usually this process entails downloading the correct drivers, decompressing them to the appropriate directory, and enabling the plugin, although you may need to manually edit some text files if required by the plugin. Regardless, *PE Builder* will provide step-by-step instructions for each supported plugin. If your hardware isn't listed as supported by *PE Builder*, you may be able to find it by searching the Internet.



To enable a plugin, highlight the feature, click Enable, and follow the directions that *PE Builder* gives you.

Once you've installed drivers for your RAID or SATA controllers and network controllers, it's time to install applications.


Stinger
File About
Scan Now
Stop
Preferences
List Viruses
Scanning:
Directory: C:\Documents and Settings\jnorem\Application
File: C1704108d01
McAfee AVERT Stinger Version 2.4.4.0 built on Nov 8 2004
Copyright (C) 2004 Networks Associates Technology, Inc. All Rights Reserved.
Virus data file v1000 created on Nov 8 2004.
Ready to scan for 45 viruses, trojans and variants.
Scan initiated on Tue Nov 16 14:39:40 2004
Scanning...

Add applications

The most important applications to include on your BartPE disc are virus- and spyware-removal programs. Without them, your BartPE disc will be little more than a nifty toy.

McAfee offers two free virus scanners that should take care of all your antivirus needs. *Stinger* is a stand-alone app that checks for any bad worms floating around on your PC. *SuperDat* is a command-line app with a GUI that scans for a comprehensive list of viruses. Both are easy to install using the instructions built into *PE Builder* and they'll take up very little space on your BartPE disc.

For combating spyware, we recommend *Ad-Aware*. When this magazine went to press, a plugin for the program was unavailable, so you'll need to follow the instructions in the next step for manual installation.

As with the drivers, you'll have to install applications yourself. If there is a supported plugin, the process is exceedingly simple—hitting the PluginHelp button will give you links and directions.

Adding Ad-Aware

Before you bolt *Ad-Aware* onto your BartPE disc, you need to first download and install it to your computer. You can get *Ad-Aware* from **www.lavasoftusa.com/software/adaware**.

From within Windows, navigate to the Programs\Lavasoft\ directory and copy adaware.cmd, ad-aware.exe, alert.wav, defs.ref, default.awl, as well as the three subdirectories—Lang, Plugins, Skins—to the "\pebuilder3032\plugin\adaware" directory. Copy the contents of the Lang and Skins subdirectories into the same directory as ad-aware.exe. Unfortunately, the adaware.inf file included with *PE Builder* is out of date, so you'll need to update it. We found an INF file created by Malok that seems to fix it.

In the plugin\adware\ directory, open the file adaware.inf and add the lines: `c="Programs\adaware\Plugins",2` and

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```
d="Programs\adaware\Skins",2
```
to the [Winntdirectories] section. In the [SourceDisksFiles], add the lines:

```
alert.wav=a,,1
defs.ref=a,,1
default.awl=b,,1
Ad-Aware SE default.ask=c,,1
```

And remove the lines aawhelper.dll, reflist.ref, English.bmp, English.det, and English.ini. from the section. The finished file should look like:

```
[WinntDirectories]
a="Programs\adaware",2
b="Programs\adaware\lang",2
c="Programs\adaware\Plugins",2
d="Programs\adaware\Skins",2

[SourceDisksFiles]
adaware.cmd=a,,1
ad-aware.exe=a,,1
alert.wav=a,,1
defs.ref=a,,1
default.awl=b,,1
Ad-Aware SE default.ask=c,,1
```

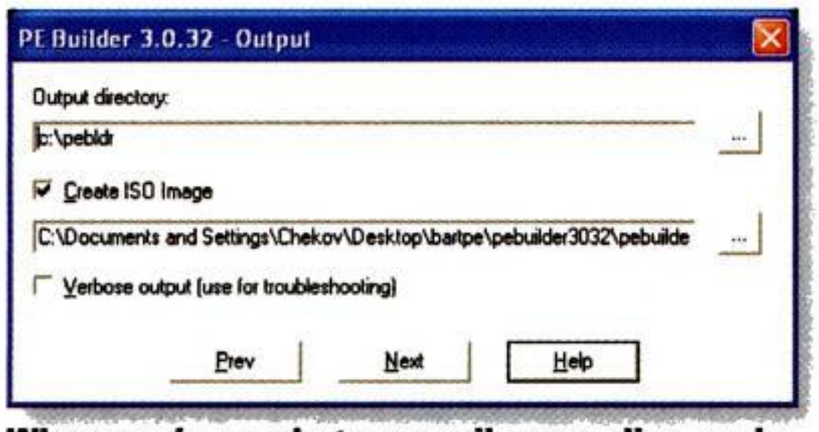
Save the *INF* file and enable the *Ad-Aware* plugin within *PE Builder*. If you followed directions, the application should now be properly installed.

You should also remember that when you run a scan from the BartPE disc you need to perform a custom scan and set it to scan the drive on which the OS is installed. If you don't, *Ad-Aware SE* will simply scan your BartPE disc, which is useless.

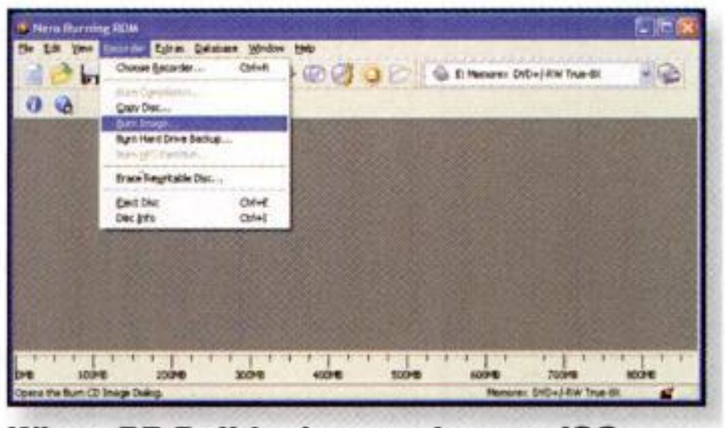
Burn your BartPE disc

Once you're satisfied with your disc contents, click "Next" to get to the Build screen. Here you tell *PE Builder* where to store the source files for the compilation. These source files stay on your machine so you can quickly and easily create an ISO disc image at any time. You can change the target directory for storing files, but make sure you have enough space—it will require about 800MB.

PE Builder will offer you the option to create an ISO image and ask where you want to create it. The default location is the *PE Builder* directory itself. We strongly recommend that you let *PE Builder* create the ISO at this time. The program will scoop up and compile the plugins and drivers you've collected and read the necessary files from your Windows CD. Once done, all you have to do is fire up *Nero*, select Recorder/Burn Image, and point it to the *PE Builder* directory. Voila! You've created a personalized BartPE disc.



When you're ready to compile your disc, make sure the Create ISO Image box is checked and that you know where the final ISO disc image will be sent.



When *PE Builder* has made your ISO, use *Nero* to burn the image.

PE Builder 3.0.32 - What to do?
Manual build
Walk through all input options and build.
Auto build
Use previous input settings. Build ISO image to C:\Documents and Settings\Chekov\Desktop\bartpe\pebuilder3032\pebuilder.iso.
ISO build
Only rebuild the ISO image. Do not rebuild the files. Build ISO image to C:\Documents and Settings\Chekov\Desktop\bartpe\pebuilder3032\pebuilder.iso.
Exit
Next

If you make further tweaks to your BartPE disc, you'll need to select "Manual build" when you start.

Test it

Test the BartPE disc by putting it in your machine and rebooting. Make sure your BIOS is set to boot from the optical drive. If you're not running any exotic RAID or SCSI drives as your primary boot disk, it should work like a charm. If Windows is installed on a SATA drive or RAID array, and BartPE isn't detecting it, you may have to go back to the "Add drivers" section and make sure you installed the driver for your particular hard drive controller.

After you've used *PE Builder* once, the program will begin asking you if you want to do a manual build, an auto build, or an ISO build. To rebuild your BartPE disc from scratch, use the "manual build" option. To rebuild the disc with the same drivers and plugins you originally used, but update to the latest operating system files, select "auto build" and make sure your OS disc is handy. If you just want to rebuild the original ISO you created and save the appropriate files on your hard drive, select "ISO build."

A stock BartPE boot disc will give you this basic desktop and a Go button to access your features.

Is it legal?

When we recommended BartPE in our 2004 Trauma Kit, readers asked whether it was legal to build such a disc. According to Bart Lagerweij, who has survived Microsoft's scrutiny thus far, it depends on how you use it.

A BartPE disc can be legally used as long as the BartPE disc and the licensed version of Windows you used to create the BartPE disc are not used simultaneously. So if you create a BartPE disc from your OS disc and use it to troubleshoot your own PC, you're fine.

Lagerweij also points out that if you are a licensee of Microsoft's own Windows Preinstall Environment (WinPE) software used by system OEMs and large IT departments, you cannot use BartPE because of the terms of the Microsoft license.

Finally, to truly prevent people from using a BartPE disc as an illegal OS, the program contains a timer that reboots the machine after 24 hours and allows you to run only six processes.

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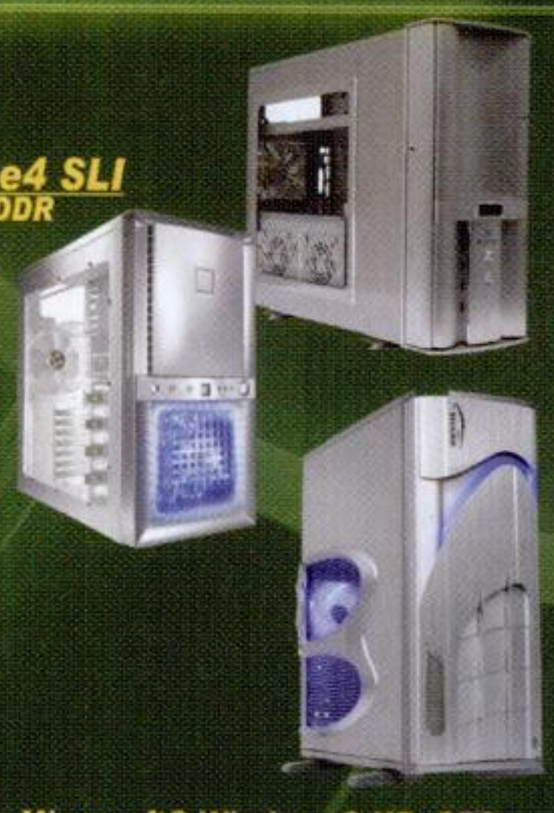

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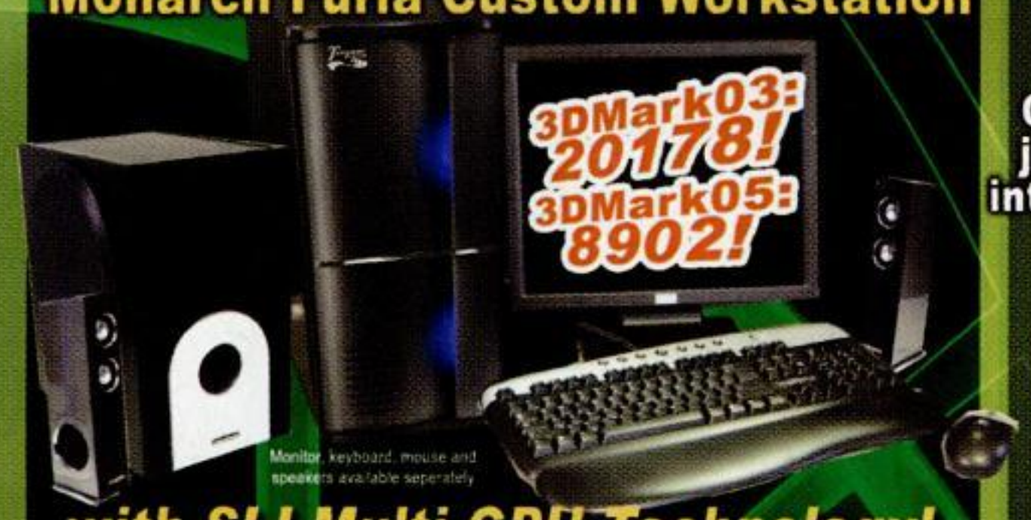

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How To... A step-by-step guide to tweaking your PC experience

MAKE AN XP Slipstream CD

Add RAID drivers and Service Pack 2 to your original Windows CD!

Think of how you treat a brand-new car: You cherish and pamper it at first. You even give up your Sunday afternoons to wash and wax it by hand. Your heart skips a beat whenever you see that gleaming steel beast waiting for you in the parking lot.

A newly installed version of Windows XP can inspire similar devotion—and be the ultimate solution to fixing a wonky PC when all else fails. Not only do you thrill at its pristine condition, but you also patiently, and even eagerly, download all the latest patches from Windows Update so as to keep your OS shipshape.

But over time, most of us begin to take that new car—or that clean WinXP installation—for granted. As it accumulates miles and wear-and-tear, your erstwhile pride and joy becomes just another drain on your wallet—and your time. Hand-washing, you discover, just isn't worth the effort anymore. In its place: a quickie car wash at the local gas station. If only there were a simple wash-and-rinse equivalent for WinXP.

Guess what? Such a thing does exist. It's called a Windows XP *reinstall*—and the quickest, easiest method for reinstalling is to create an up-to-the-minute Windows XP setup CD with the latest Service Pack and drivers preinstalled (aka "slipstreamed"), so you won't have to spend half your life on Microsoft's Windows Update web site. As always, *Maximum PC* is here to show you how it's done. Heck, we'll even help you add RAID or Serial ATA controller drivers to your CD so you won't need a floppy drive (or the F6 key) to install Windows.

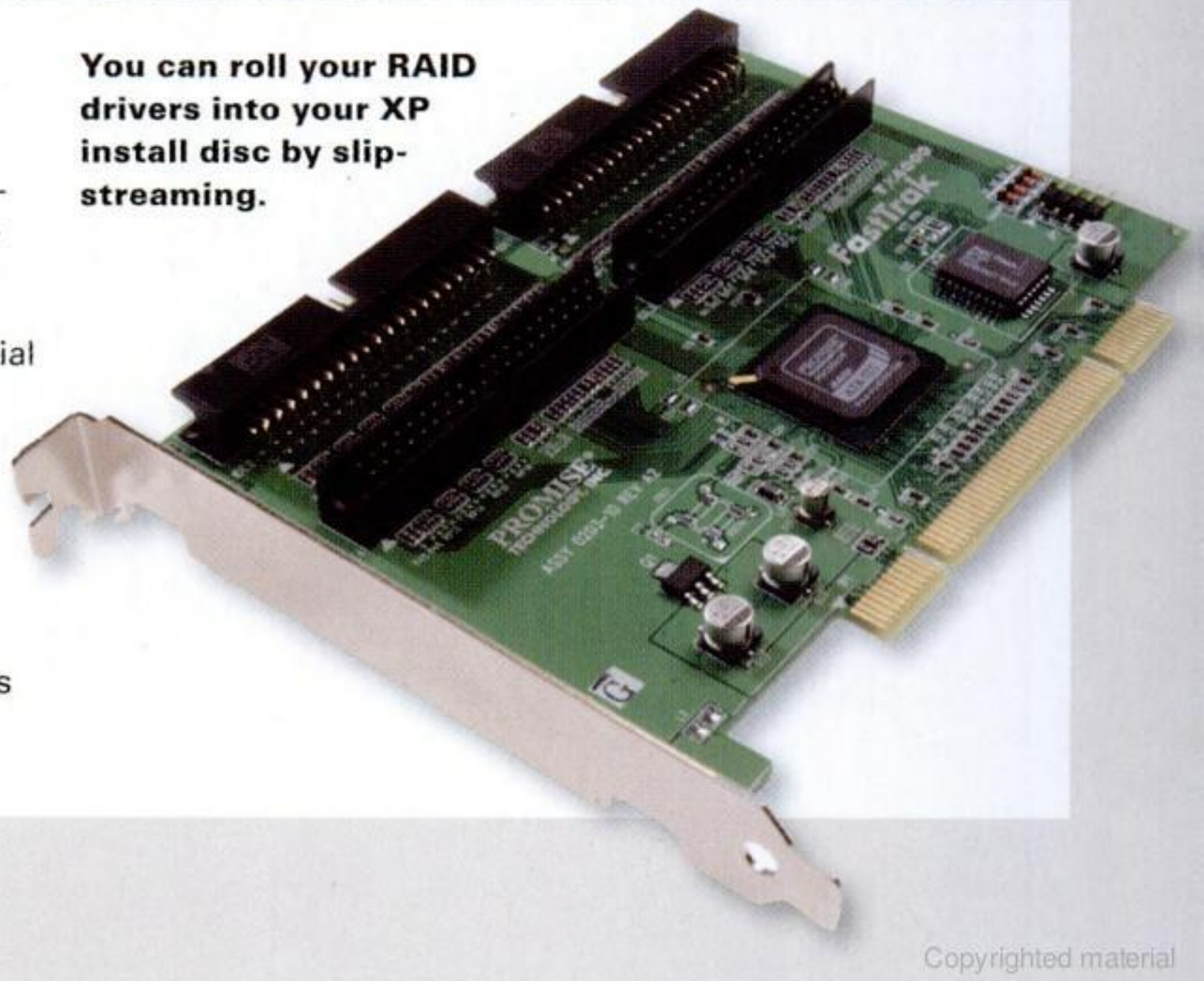
Ingredients

- Windows XP CD
- Internet connection
- CD burner
- *ISO Buster (On the CD!)* (www.isobuster.com)
- *Nero 6.6* (On the CD!) (www.nero.com)

1 Collect the Necessary Files

Before getting started, we'll need to download the full, standalone installation of Service Pack 2 (as opposed to performing a web-based upgrade). Go to download.microsoft.com and look under the Windows XP section.

While you're at it, grab the latest drivers for your RAID or Serial ATA controller. If you add them to your install CD, you won't need to use an old-fashioned floppy drive to install Windows. For an add-in RAID or SATA card, look for the drivers on the web site of your controller chip's manufacturer. Some of the most popular controllers are made by Promise (www.promise.com), Intel (www.intel.com), Silicon Image (www.siliconimage.com), and HighPoint (www.highpoint-tech.com). If your controller is integrated onto your motherboard, hit up your mobo manufacturer's web site.



You can roll your RAID drivers into your XP install disc by slipstreaming.

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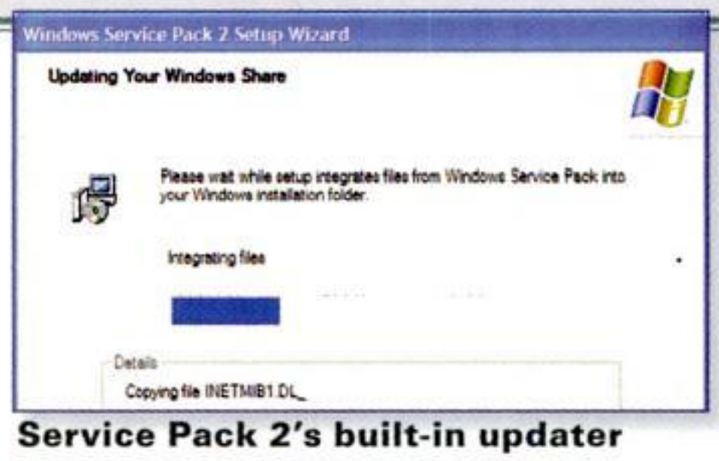
2 Update Your Setup Files

Our next objective is to extract Service Pack 2 to a folder so we can update our existing Windows setup files. Open the command prompt by clicking Start, Run, and typing `cmd.exe`. Use the change-directory command to navigate to the folder where you just saved the SP2 executable in the previous step. (The syntax for change-directory is `cd <path>`, so if you saved the SP2 executable to, say, `C:\Downloads`, you would type `cd C:\Downloads` to go there.) Extract the SP2 files by typing `xpSP2 -x`, where xpSP2 is the name of the SP2 executable you downloaded. When prompted for a destination to extract the files to, enter `C:\xpSP2`.

Once the files have been extracted, insert your Windows XP CD into an optical drive and copy its entire contents to a different folder on your hard drive. To keep it simple, use `C:\xpsetupcd` as the folder. Now, return to the command prompt and type the following command: `C:\xpSP2\i386\update\update /s:C:\xpsetupcd`. This will update your existing Windows setup files with the new code contained in Service Pack 2. A message box will pop up to notify you when the process is complete.


Windows Service Pack 2 Setup Wizard
Updating Your Windows Share
Please wait while setup integrates files from Windows Service Pack into your Windows installation folder.
Integrating files
Details
Copying file INETMIB1.DL_

Service Pack 2's built-in updater makes it easy to patch your original Windows setup files with Microsoft's latest code.

3 Add Your RAID/SATA Drivers

We're now ready to add RAID/SATA controller drivers to our CD (if you don't want to do this, skip ahead to the final step). Open the folder to which you copied your Windows XP CD (`C:\xpsetupcd`) and create a subfolder called `$OEM$`. Then, create a subfolder of `$OEM$` called `$1` and a subfolder of `$1` called `drivers`. The resulting path should be `C:\xpsetupcd\$OEM$\$1\drivers`. This is where Windows Setup will look for drivers that aren't contained in its standard driver library. For organizational purposes, make a subfolder within `drivers` named for the type of driver it will contain—for instance, create a `RAID` folder for RAID drivers or an `SATA` folder for Serial ATA drivers. You can use any name, as long as it has fewer than eight characters.

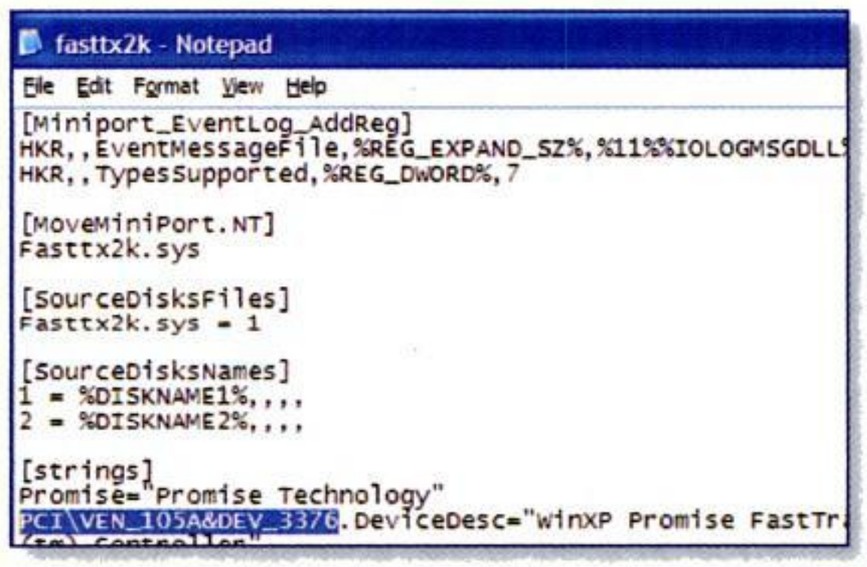
With the aforementioned folder structure in place, copy the Windows XP RAID/SATA drivers directly into the folder you created above (we used `C:\xpsetupcd\$OEM$\$1\drivers\RAID`). If your drivers came in a self-extracting executable rather than a zip file, you may be able to extract its contents manually by opening it in a program like *WinRAR* (available at **www.rarsoft.com**). (Alternatively, you can run the self-extracting executable, then dig around in your system's TEMP directory—usually C:/Documents and Settings/YourUsername/LocalSettings/Temp—until you find the right directory.) Finally, locate the SYS file for your RAID/SATA controller from among the files you just extracted; it should be named after your specific controller (e.g., `fasttx2k.sys` for a Promise FastTrak TX2 RAID controller). The drivers for different operating systems may be split into distinct folders, so make sure you find the SYS file that's intended for Windows XP. Once you find the SYS file, copy it to the `i386` folder of your Windows CD (`C:\xpsetupcd\i386`).

Adding RAID or Serial ATA drivers to your Windows CD will save you the trouble of using a floppy disk to manually install them every time you reformat.

4 Introduce Windows to Your Drivers

Now that we've added our RAID/SATA driver files to the mix, we need to tell Windows Setup about the existence of these drivers and how to use them. But unless you happen to have this information memorized—and if you do, this might be a good time to turn off your computer and spend some time in the real world—you'll need to look it up in your driver's INF file. This file is usually found in the same place as the SYS file you located in the previous step and will probably have the same name, albeit with an INF extension. Open the INF file in **Notepad** and copy the PCI identifier string, which is a series of characters beginning with "`PCI\VEN`"—for instance, `PCI\VEN_105A&DEV_3376`. There may be other text on the same line as the identifier string; if this is the case, start at the first occurrence of `PCI\VEN` and copy the text up to but not including the first period (or the end of the line, whichever comes first).

Next, open `TXTSETUP.SIF` (situated in `C:\xpsetupcd\i386`) and paste your PCI identifier string under the [HardwareIds Database] section of that file. At the end of the string, add an equal-sign followed by the driver name in quotes. In the case of our Promise RAID controller, the resulting line is: `PCI\VEN_105A&DEV_3376 = "fasttx2k"`. Note: If your driver's INF file contains multiple PCI identifier strings, copy all of them into `TXTSETUP.SIF`. Now scroll down to the [SourceDisksFiles] section of `TXTSETUP.SIF` and add the following text: `driv-`



Somewhere in the depths of your RAID/SATA controller's INF file lurks the fabled PCI identifier string.

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er_filename.sys = 1,,,,,,,x,4,1 where "driver_filename.sys" is the name of your RAID/SATA driver's SYS file. Note that you should include the .sys here. Then, under the [SCSI.Load] section, enter: driver_filename = driver_filename.sys,4. Once again, "driver_filename" is the name of your driver's SYS file. Note the lack of a .sys suffix on the left side of the equal-sign.

Finally, in the [SCSI] section of the file, add the following: driver_filename = "RAID/SATA Device Name"

You can enter whatever you want for "RAID/SATA Device Name," but we recommend using a meaningful description (such as the name of your RAID/SATA controller). Finally, save and close TXTSETUP.SIF.

5 Create a Customized Setup Routine

You're almost there. In this step, we'll make a file called WINNT.SIF in the i386 folder of our Windows setup files (C:\xpsetupcd\i386). This file can be used to create an unattended installation routine—a subject beyond the scope of this how-to—but we'll simply use it to point Windows to the drivers we've slipstreamed. Create WINNT.SIF and enter the following:

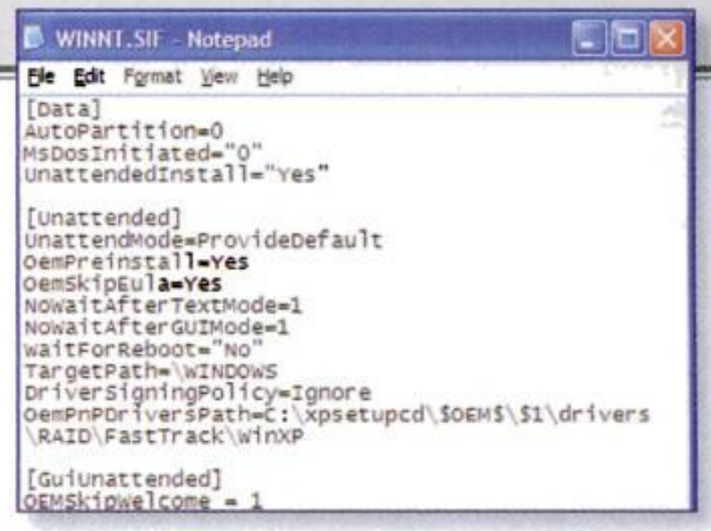
```
[Data]
AutoPartition=0
MsDosInitiated="0"
UnattendedInstall="Yes"

[Unattended]
UnattendMode=ProvideDefault
OemPreinstall=Yes
OemSkipEula=Yes
NoWaitAfterTextMode=1
NoWaitAfterGUIMode=1
WaitForReboot="No"
TargetPath=\WINDOWS
DriverSigningPolicy=Ignore
OemPnPDriversPath=

[GuiUnattended]
OEMSkipWelcome = 1

[UserData]
ProductKey=
FullName=""
OrgName=""
```

You'll need to customize the OemPnPDriversPath line by entering the path to the INF file for your RAID/SATA driver (for instance, if your drivers are in C:\xpsetupcd\i386\$OEM$\$1\drivers\RAID, use: OemPnPDriversPath=drivers\RAID\FastTrack\WinXP).



WINNT.SIF is a powerful file that allows you to customize and automate many parts of the Windows installation process.

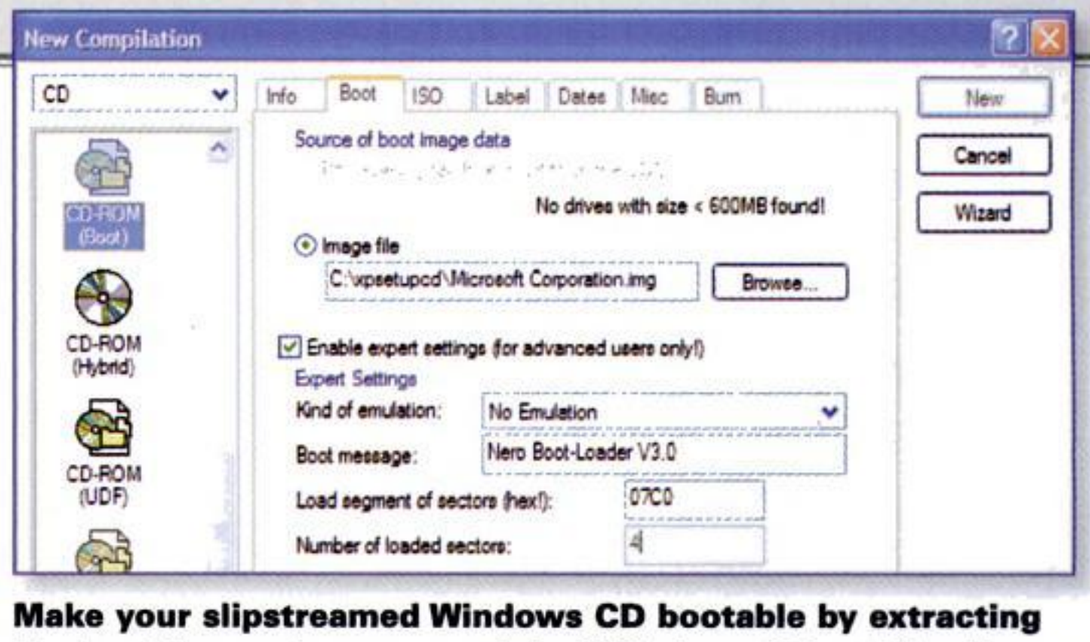
There are a few other fields you may want to customize before you close WINNT.SIF. Type your product key, name, and company name in the ProductKey, FullName, and OrgName fields, to avoid having to enter them during setup. And if you'd like to install Windows to a folder other than C:WINDOWS, edit the TargetPath field as needed.

6 Prepare Your Bootable CD

Our next task is to extract the boot image from our original Windows XP disc so we can use it to make our slipstreamed CD bootable as well. With your original XP CD inserted, launch *ISO Buster* and select "Bootable CD" from the left pane. In the right pane, right-click Microsoft Corporation.img and choose "Extract Microsoft Corporation.img." Extract this file to the folder where you copied your XP setup files (C:\xpsetupcd).

Fire up **Nero Burning ROM** (or **EZ CD Creator**, or any other CD-burning app) and go to the New Compilation window (click "Close Wizard" if **Nero's** wizard comes up). Select "CD-ROM (Boot)" from the left pane and open the Boot tab. For "Source of boot image data," choose "Image file" and use the Microsoft Corporation.img file you just extracted. Check "Enable expert settings..." and set "Kind of emulation" to "No emulation" and "Number of loaded sectors" to 4. (These instructions will vary if you use another application, of course.)

Next, head over to the ISO tab and set "File/Directory name length" to "ISO Level 2." Ensure that "Format" is set to "Mode 1" and "Character Set" to "ISO 9660," and make certain all four checkboxes on this tab are checked ("Joliet," "Allow pathdepth of more than 8 directories," "Allow more than 255 characters in path," and "Do not add the ';1' ISO file version extension"). Finally, click the Label tab and set the "Volume Label" field to the value used by your original Windows XP CD—this is the name that appears next to your CD-ROM drive in My Computer when your XP CD is inserted.



Make your slipstreamed Windows CD bootable by extracting the boot image from your original Windows CD and feeding it to *Nero*.

At this point, we're almost ready to rock. Click the "New" button to open the Nero File Browser, and then locate the folder where you copied your Windows XP CD. Open the folder and add its entire contents to your CD image. When you're all set, mash the "Burn" button and bask in the glory of your shiny new slipstreamed Windows XP CD, complete with RAID/SATA drivers and Service Pack 2! ■

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How To...

A step-by-step guide to tweaking your PC experience

MANAGE YOUR Computer Cables

Organize your messy cables with this easy-to-follow guide

It might not be the most exciting thing to do, but you can take a big step toward making hardware troubleshooting, not to mention upgrading, much easier simply by keeping your cables organized. Take a long, hard look at the rat's nest of cabling behind your computer, and it's quickly obvious why we're considered a "wired" society. You've got the cables from your monitor, your keyboard and mouse, your printer, network connection, your 5.1 speaker set, and the list goes on. It's clear that the wireless utopia we've all been promised is a long way off, which is why we prepared this guide.

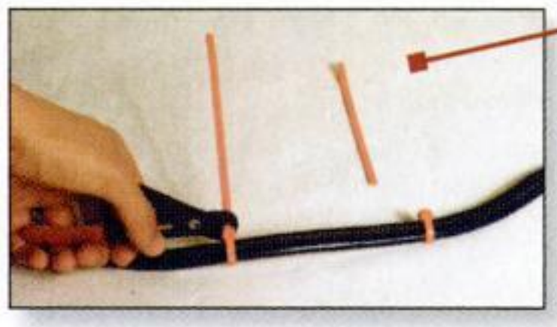
By the time you're done following our suggestions, you'll have turned your jungle of cables into a neat, tidy bundle. And you'll feel better about yourself in the process. Consider the following tips and execute the solutions that work best for you. Most of the featured products can be found at **www.cableorganizer.com** and other major outlets.

A zip-tie primer

The simplest method for getting unruly cables under control is to tie them together with zip ties. These disposable strips of plastic are a cheap and effective cable management solution that should be in every toolbox. Here are a few tips to keep in mind when using zip ties to instill order.

Before you start tying your cables together, plan ahead and separate the cables into logical groupings. For instance, we tied our monitor's power and data cable together. This keeps things neat and tidy, and ensures the cables won't get separated.

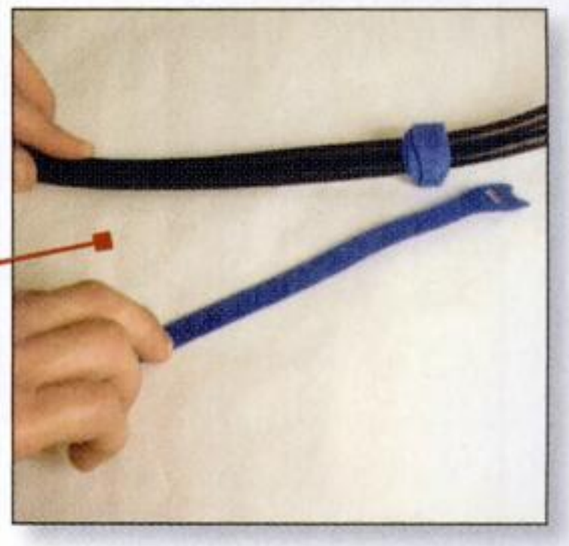
When tying down cables, make sure you leave some room for slack, especially when it involves a component that needs to be moved around, such as a mouse.



Once you've secured the zip tie, snip off the excess with a pair of scissors or wire snips. This not only makes for a cleaner look, but also ensures that the tie won't get snagged on anything.

Here's an easy way to get rid of a zip tie once it has served its purpose. Instead of using a sharp implement to cut the tie, which can potentially cause damage to the bundled cables, simply use a wire snip and cut off the head of the tie.

If you move your system around periodically or perform frequent upgrades like we do, you should use Velcro straps instead of zip ties. These versatile strips of fabric are reusable and, as an added bonus, they make that familiar tearing sound that we all know and love.



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How to eliminate wires

Here's a no-brainer: If you reduce the number of cables, you reduce the amount of clutter that you have to deal with. This is why we replace our wired components with wireless alternatives whenever we upgrade. For instance, we swapped our old wired keyboard and mouse for the Logitech Cordless Desktop MX Duo for Bluetooth, which is indistinguishable from a wired mouse and keyboard, and can connect to any Bluetooth device on the market.

Switching your home network over to a wireless setup can also help by eliminating those bulky networking cables that are currently snaking through your house. But if you *must* have a wired setup, you can still hide your unsightly networking cables by routing them through a length of cable protector. Not only will the tough plastic housing hide your cables, but it will also help protect them in high-traffic areas.

Maximize your use of sleeves

Another effective method for bundling your cables together is to fit them into off-the-shelf sleeves or tubes built for this purpose. A recommendation: Use a hot knife to cut sleeving; this will help prevent frayed ends, but if you don't have access to a hot knife, you can use a zip tie or Velcro strap to cover up the exposed ends.

Clamp down on loose cables

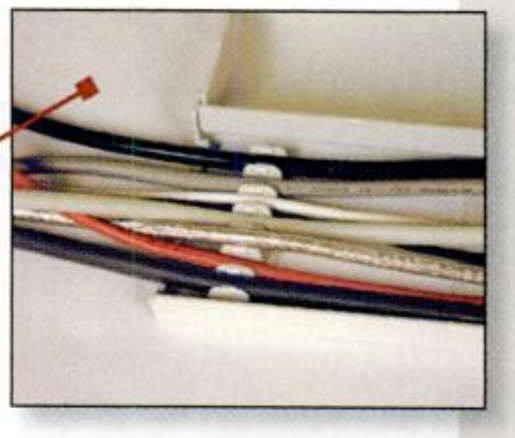
Another method for bundling your cables together is the handy-dandy cable clamp. Like the Velcro straps mentioned earlier, clamps are reusable and easily removed—an important consideration if you're constantly changing your system's configuration. You simply slip your cables through and close the clamp around the bundle. How simple is that?

Hang 'em high

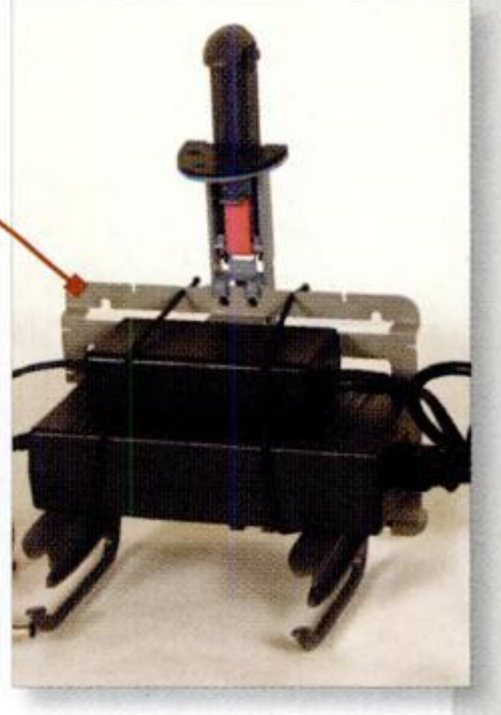
In certain situations, it may be easier to simply hang your pesky wires out of the way. We used this cable clip and hook from 3M to route a set of wires along the wall behind our workspace. It's decidedly low-tech, but it works, especially if you don't have that many cables to contend with.

Consider an all-in-one solution

If you'd prefer to route all your cables at once, you should look into the Belkin Cable Organizer. It allows you to route up to 14 cables through plastic housing, and can be mounted either underneath your desk or up against a wall.



The Complete Cable Manager from Cable-Safe takes the all-in-one concept a step further by allowing you to manage all your cables as well as your surge protectors and power bricks. It clamps onto your desk and comes with enough hooks and space to get those bulky power supplies off the floor and out of your way.



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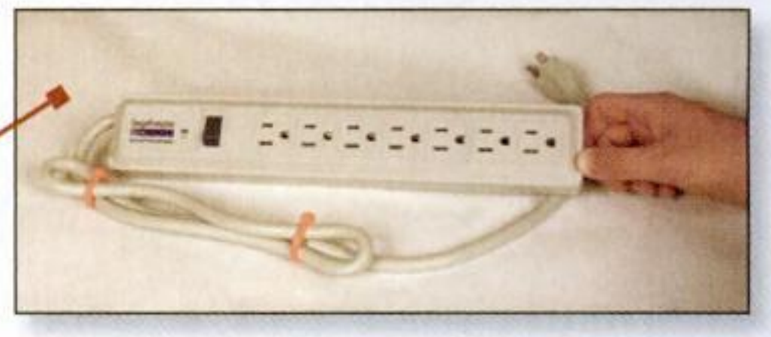
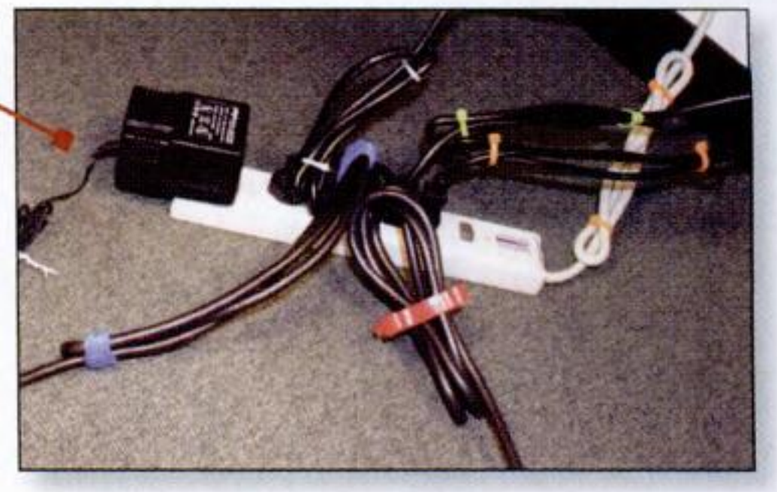
Reclaim your power supply

Everyone knows you shouldn't plug a system directly into an outlet. Power surges and lags can cause damage to sensitive system components, which is why we always use a surge protector or UPS to help keep our PCs from falling victim to electrical mishaps. Unfortunately, these bulky units cause even more cable snarl underneath your desk. This is the chaotic mess we saw every time we looked down at our feet. Here's how we tamed this ferocious entanglement.

We dealt with the surge protector's power cord by first unplugging all of the attached devices and folding the power cord into a loose bundle. We made sure to leave enough all-important slack, then we used a couple of zip ties to cinch the cord.



Next, we plugged our devices back into the power strip. We gave a gentle tug on each cord to determine how much slack was needed, and then we folded the excess and tied them down.



That's so much better! If you really want to go all-out, you can even mount your power strip to the underside of your workspace or to the wall using metal brackets.

Organize your USB hub

If you're like us, you love the versatility and plug-and-play nature of USB devices. We keep a speedy USB 2.0 hub on our desk at all times loaded with useful devices like a media reader, game pad, headset, and coffee mug warmer. This can get pretty messy—USB cables can generate some seriously disruptive snarl.

Straightening out this mess is a simple matter of cinching down the cables with some zip ties. We left more excess cable free than we normally would so we could move the attached devices around without disrupting the entire hub.

The optimal placement for a USB hub is in a central location so you have easy access to the ports. If your hub keeps sliding around, attach a piece of adhesive backing to its underside and stick it to your desk or to the top or side of your computer case.

Clean up your surround sound system

Multi-speaker surround sound systems are all the rage these days and have become so affordable that it's almost a crime not to have one. But one of the biggest obstacles to enjoying a 5.1 or 7.1 setup is managing the mass of speaker wire that ends up running all over your office—or house. Here are a few tips to help get those wires under control.

When running wire to satellite speakers, route the wire along the floor and along doorways. To make them as inconspicuous as possible, secure the wire with plastic wire holders, which are available from any hardware store. Make sure you perform an initial "dry run" with tape to avoid mistakes.

If you have wall-to-wall carpeting, you can route your wires along the edges of the carpeting using a flathead screwdriver.

Tie together the wires behind your main subwoofer and/or audio component to create a sense of order. First we fold the power cord and tie it down. Then we group the input cables together using some flexible plastic wire loom. Finally, we run the wires out to the individual satellites from there. ■

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How To...

A step-by-step guide to tweaking your PC experience

Build a really, really, really SILENT PC

We assembled a Pentium M–based rig with a fanless power supply, and ended up with the quietest air-cooled PC we've never heard

MAXIMUM PC
TIME TO COMPLETION
03:00
HOURS MINUTES

There are times in life when your PC's noise level doesn't matter—for instance, when your college roommate complains your computer is too loud. (Too loud? Deal with it, Kirby, Mr. "Who the Hell Drank My Last Mango Madness Snapple," complaining-ass punk.)

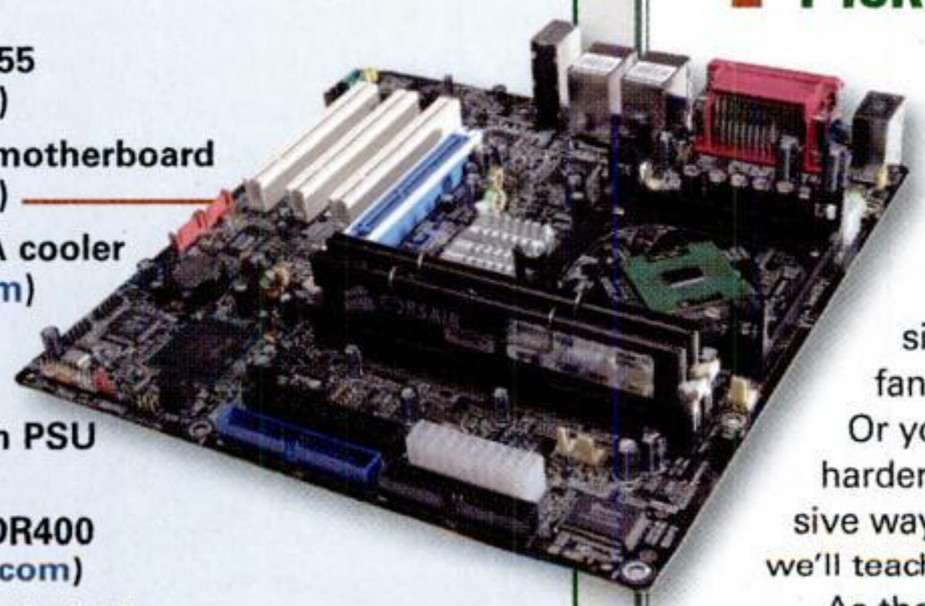
But, hey, we're not all dorm-rats, and sometimes silence is indeed necessary. Does your cat run underneath the bed whenever you turn on your rig? Does your pregnant wife complain more about fan volume than rocket-launcher volume? You, friend, need a silent PC.

There are a variety of ways to muffle the decibles emanating from any PC, but the best way to get a truly silent machine is to start from scratch. When conceiving this step-by-step, we wanted to avoid heroic—and expensive—silencing measures, such as water cooling or the use of a specialized case. We were also determined to avoid performance sacrifices. And so, in our battle against Hoover-like sound levels, we focused our attention on traditional PC parts expressly designed for cool, quiet operation. We've done all the hardware troubleshooting for you. We chose products that require less cooling than competing hardware, which in turn allowed us to install fewer fans, and run slower fan speeds than what would normally be considered safe.

For the sake of this how-to, we're going to assume you've built a system before, and we'll only be highlighting steps that are specific to the construction of a quiet PC. Now, if you haven't built your own PC before, don't fret. Head to the reprints section of www.maximumpc.com and look for the Build It feature, which walks you through every step of building your first PC.

Ingredients

- Intel 2GHz Pentium M 755 ($440, www.newegg.com)
- AOpen i855GMEm-LFS motherboard ($275, www.newegg.com)
- Zalman VF700-AlCu VGA cooler ($40, www.zalmanusa.com)
- Antec TriCool fan ($20, www.antec.com)
- Antec 350-watt Phantom PSU ($175, www.antec.com)
- 1GB of Corsair Micro DDR400 ($200, www.corsairmicro.com)
- Pioneer DVR-A08XLA optical drive ($150, www.pioneerelectronics.com)
- 160GB Seagate Barracuda 7200.7 hard drive ($115, www.seagate.com)
- Smart Drive 2002 hard-drive enclosure ($55, www.endpcnoise.com)
- Antec SLK3700-BQE case ($100, www.antec.com)
- Floppy drive ($10, generic)
- Arctic Silver 5 thermal paste ($8, www.arcticsilver.com)
- Akasa Paxmate sound-dampening material ($20, www.akasa.com.tw)



1 Pick Your Configuration

There are two ways to build a silent PC. One is to click "buy" at Voodoo PC's web site and pick up a fanless F50 system. Or you can do it the harder, but less expensive way, which is what we'll teach you here.

As the fates would have it, AOpen just began offering a unique motherboard that's perfect for this project. The i855GMEm-LFS is a micro-ATX desktop mobo that makes silent computer-lovin' with Intel's Pentium M notebook CPUs. Also known as Centrino, the Dothan-based version of the Pentium M has a rep for being fast and relatively cool (at least compared to desktop processors), which makes it perfect for our project. We chose a 2GHz chip, which gives 3.2GHz P4 Prescotts a run for their money in some productivity tests.

For 3D chores, we filled the AOpen's AGP slot with a GeForce 6800 GT card from Asus. To shush this card beyond its basic out-of-the-box quietness, we replaced the stock cooler with a Zalman VF700-AlCu VGA Cooler. Finally, we decided to address the annoying racket that's typically produced when optical drives spool up. Our solution was Pioneer's DVR-A08XLA, the quietest double-layer dual-format DVD drive we've tested to date. (It even features a special honeycomb pattern in its frame, which supposedly reduces the din of operation.)

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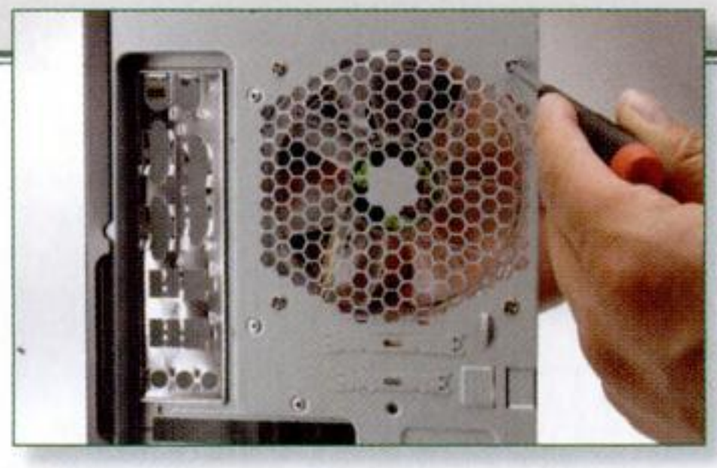
2 Prep the Case

The Antec enclosure used for this project came with a Smart Power PSU, which we swapped for Antec's fanless Phantom PSU (both are spec'd at 350W). Begone, noisy power-supply fan, begone!

We also 86ed the case's stock 120mm fan. Why? Because the stock fan runs off a standard peripheral power connector that doesn't let you vary the fan's RPM. That's no good, because we know that large fans running at low RPM produce less noise than small fans running at high RPM. Our add-in fan of choice was a 120mm Antec TriCool, which can be toggled between three RPM settings, and can run off a peripheral power connector or a three-pin mobo outlet. For this project, we chose to plug the TriCool into the mobo connector so we could further fine-tune its speed through the motherboard BIOS or OS.

While you're prepping the case, you should also install the rectangular metal I/O shield that comes with the motherboard.



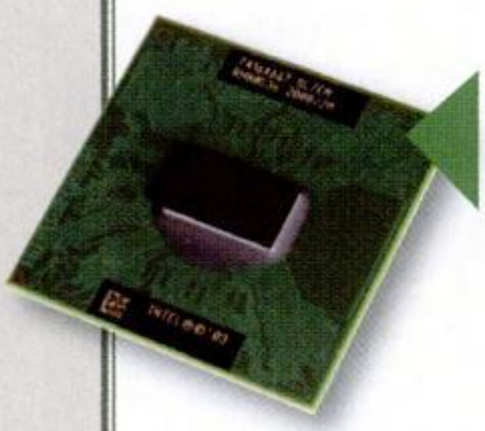
We replaced the case's stock 120mm fan with an Antec TriCool, which lets you manually adjust fan speed.

Replacing the case's stock PSU with Antec's amazing fanless PSU (the "Phantom") eliminated about half the noise the system would otherwise make.

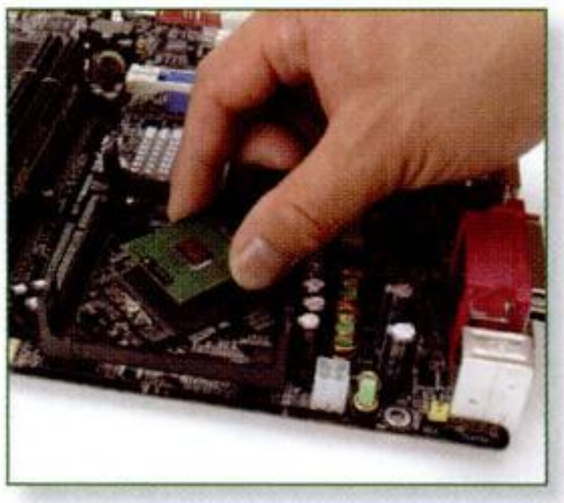
3 Prep the Motherboard

Lay the motherboard on a nonconductive surface, such as the top of the box it came in, and take all the other antistatic precautions you learned in PC Building 101. The Pentium M is built for notebook PCs featuring custom heat pipes, so when you open your processor's packaging, you'll find no heat-spreader protecting the CPU's core. Therefore, it's imperative you exercise extreme caution when holding the CPU and mounting the heatsink.

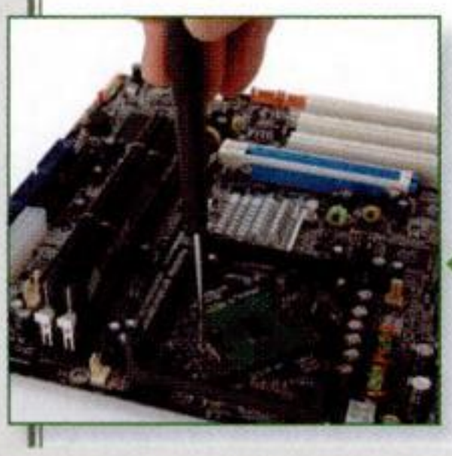
Your mobo's CPU socket should be unlocked, but if it isn't, simply use a flat-head screwdriver to turn it counterclockwise until it stops. Now, gently insert the CPU and once you're confident it's sitting firmly in the socket, use the screwdriver and turn clockwise until the CPU locks in place. As for memory, we installed 1GB of Corsair Micro DDR400. DDR400 is overkill for a chipset that runs only at DDR333 speeds, but at least we can run extremely low latencies with the Corsair modules.



Check out the big brain on Brett! The 144 million transistors in the Dothan-cored Pentium M are exposed to the world, so use extreme caution when handling and installing this baby. He ain't no regular CPU!



Get the pins right. Make sure the CPU is correctly oriented before you insert it into the CPU socket, or you could end up with horribly bent hardware.



Lock it in. Once you're certain the CPU is sitting flush in the socket, use a flat-head screwdriver to lock the chip in place by turning the locking screws clockwise.

4 Mount Up

The motherboard comes with a bit of generic heatsink paste, which we trash-canned in favor of Arctic Silver 5. When using the Arctic Silver 5, apply a dab just half the size of a BB to the core, and smooth it using your finger in a plastic bag.

The AOpen board also comes with a small CPU cooler designed for the Pentium M. We recommend you use it. Here's the deal: The Pentium M family is spec'd for Socket 479, not Socket 478, which has been designed for desktop CPUs bearing integrated heat spreaders. If you attempt to use an aftermarket Socket 478 cooler on your Pentium M, you'll be stuck with a gap between your heatsink and CPU—and that's the best-case scenario. The worst-case scenario is that you'll clamp down too hard with your aftermarket heatsink, crack the CPU core, and *adios muchacho*.

So use the bundled cooler. That said, we can tell you that we successfully mounted a massive Zalman CNPS7700-Cu on the processor. This heatsink allows you to manually adjust ride height and tension, so it will work. In the end, however, we ended up going back to the stock AOpen heatsink because the Zalman was just plain overkill for the tiny Pentium M.

To mount the bundled AOpen cooler, carefully lower it directly onto the CPU, and use the two clips to lock it in place. Now mount the whole shebang in the case as you would any other motherboard.

Use just enough Arctic Silver 5 to form a thin layer across the top of the CPU. A finger inside a clean plastic bag can be used to spread out the compound.

The motherboard comes with an aluminum heatsink that doesn't look like it would keep an Athlon XP cool, but at just 21 watts when maxed out, the Pentium M doesn't need much cooling.

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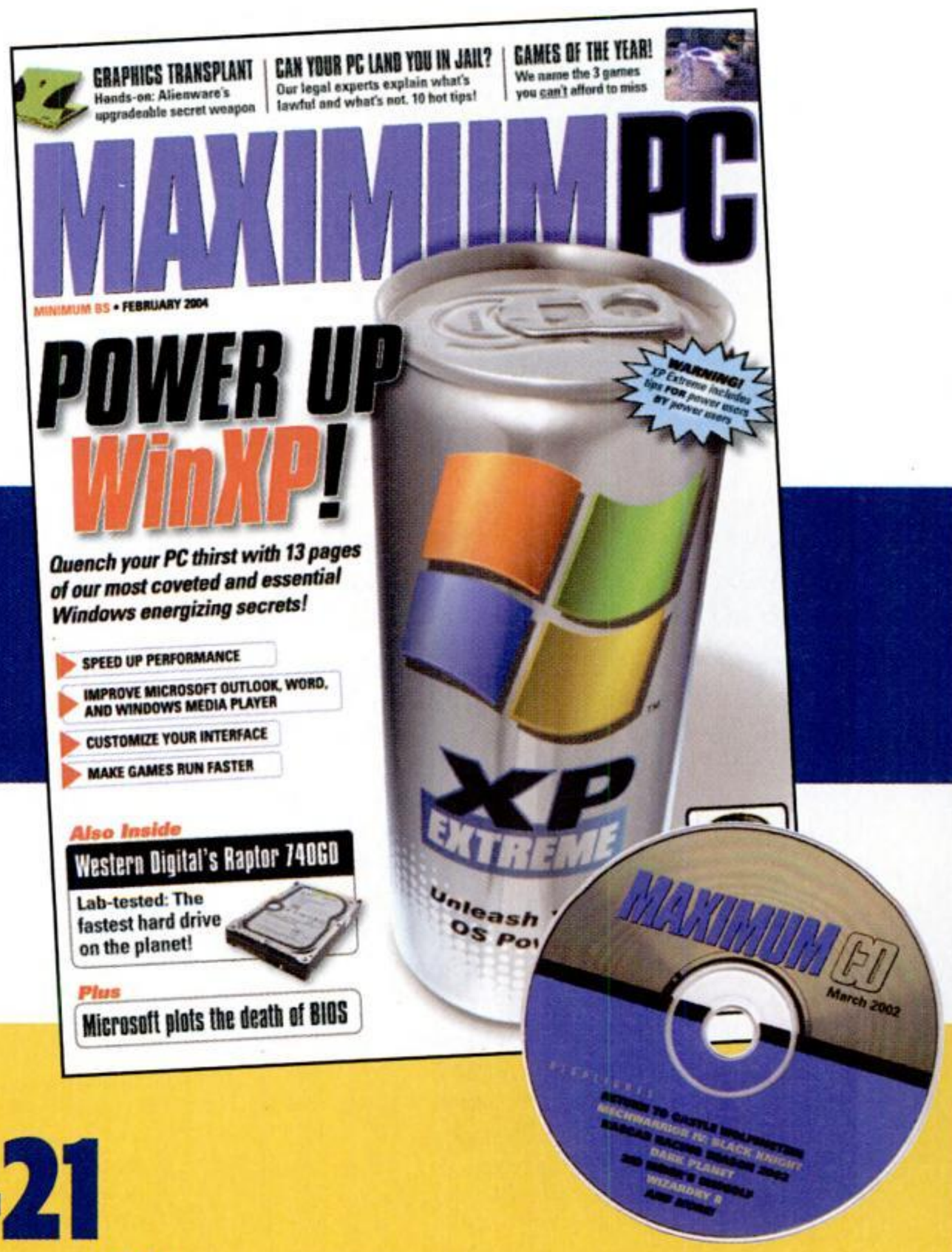
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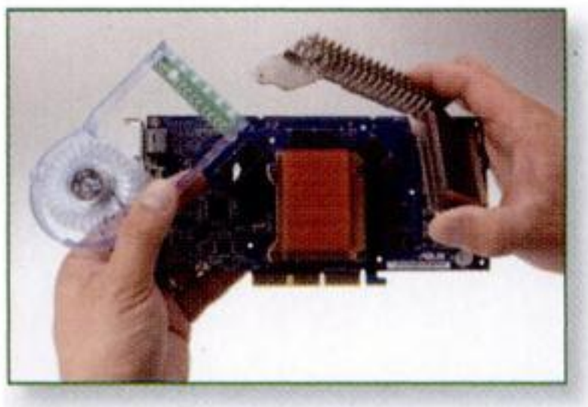
5 Prep the Videocard

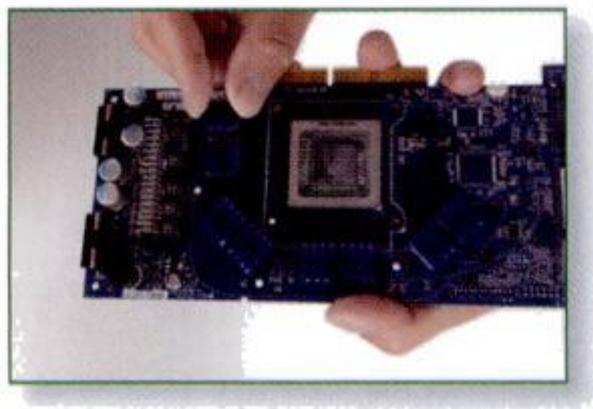
If your videocard is already quiet enough for you, and you have no desire to change its cooler, skip ahead to step 6. If not, follow our lead.

We selected a mid-grade Asus GeForce 6800 GT card for our rig. It has more than enough power for today's games, and isn't saddled with the thermal requirements of its big brother, the GeForce 6800 Ultra. The stock fan on our card was a tad shrill, so we replaced it with a Zalman VF700-AlCu VGA cooler.

To remove the heatsinks from the videocard, start by unscrewing all of the screws on the back.



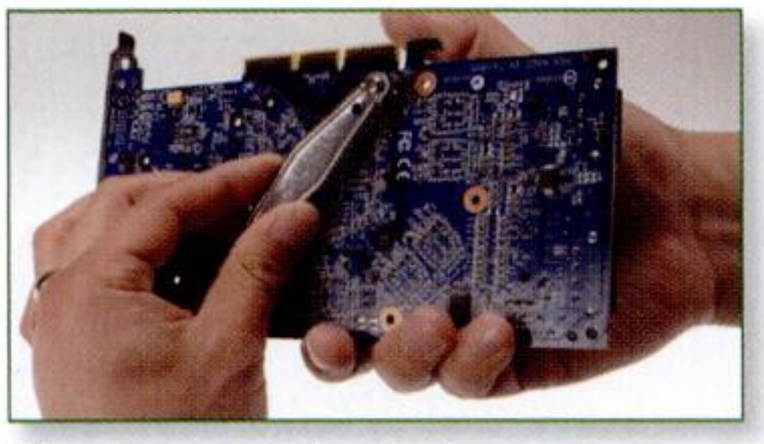
Flip over the card, remove the tiny set screws that hold the cover in place, remove all of the visible screws, and gently remove the RAM heatsink and assembly.



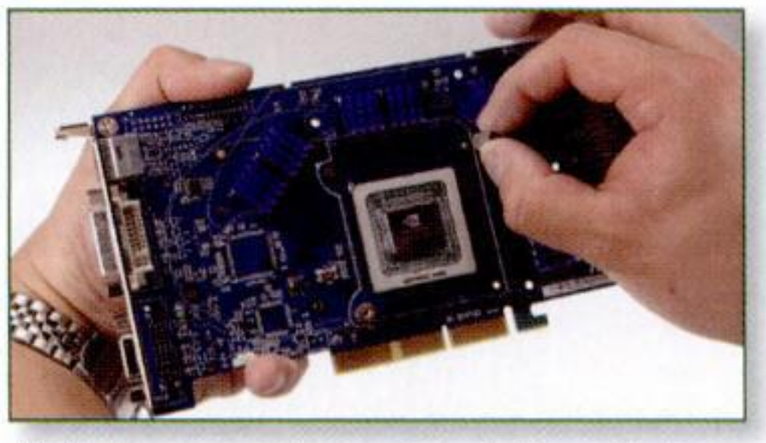
The Zalman VGA cooler we decided to use comes with RAM heatsinks that mount to the individual chips using thermal tape.

To disassemble the stock heatsink, you'll need a good set of small screwdrivers. On the rear of the card, remove the screws that hold down the RAM heatsink and fan. Put the screws in a safe place (like an old film container), and then flip over the card and remove the smaller set of screws from the fan cover. This will reveal another set of screws that will have to be tackled in order to remove the actual copper heatsink from the card. Of course, different removal procedures will apply to different cards, but keep in mind that the VF700-AlCu VGA cooler works only with single-slot cards that have mounting holes for the fan. (Zalman also makes a fanless cooler for videocards, but it doesn't cool a card's memory, and we think our 6800 GT needs the memory airflow.)

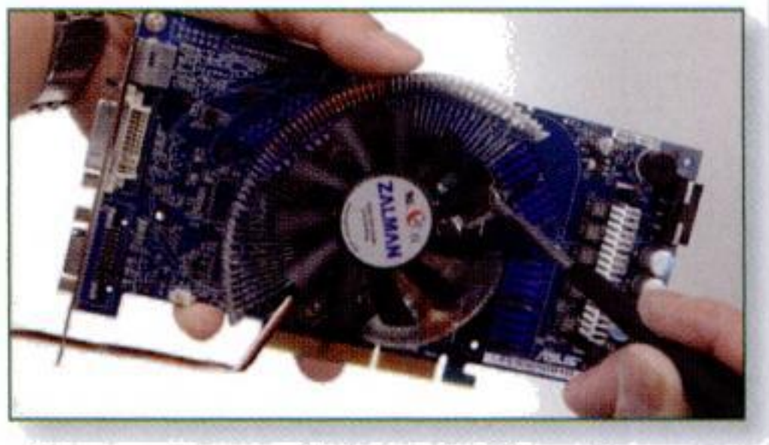
To apply the Zalman VGA cooler, you should follow the instructions included with it and take a look at our pictures to help clarify some of the steps.



After you attach the nipple spacers to the metal brace plate, add O rings to it, and gently push it through the back of the videocard.



With the metal brace placed through the back of the card, put the O rings onto the two screws sticking through the card and screw the last two nipples onto the card.



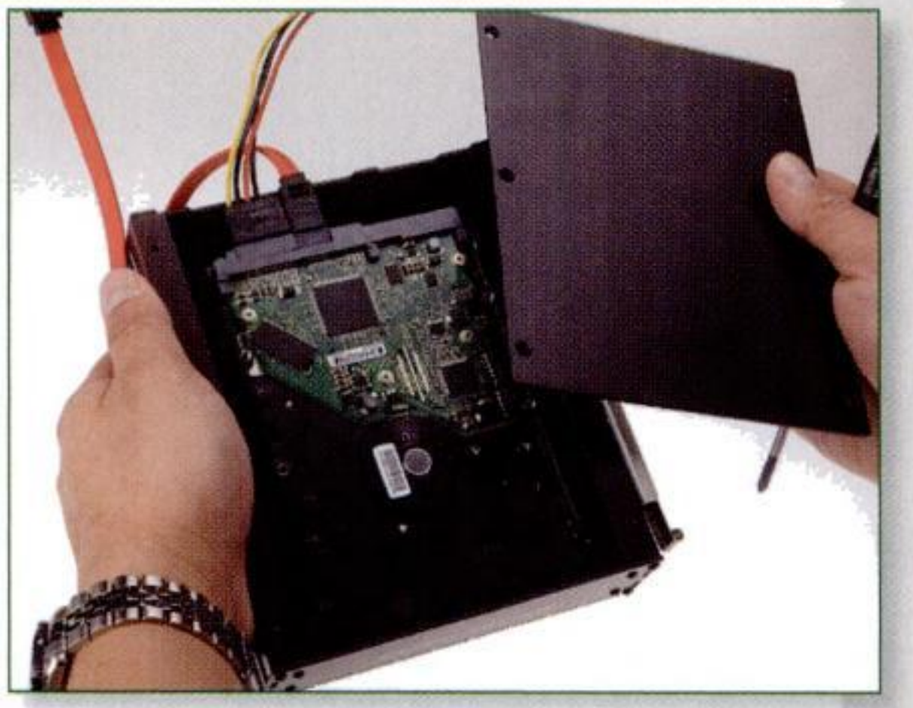
After you've applied Arctic Silver 5 to the GPU core, mount the VGA cooler to the two nipples using the final two screws in the package. Make sure both are on tight so they don't back off and let the VGA cooler flail about.

6 Quiet the Hard Drive

Hard-drive chatter can be annoying, so we decided to dampen the sound with a Smart Drive 2002 from GUP. These little enclosures can be hard to find, but they're worth the search, as they can muffle most of an HD's noise. Enough to quiet a 10K Raptor? Well, no, so we swapped out our config's Raptor drive for a Seagate Barracuda 7,200rpm drive with fluid bearings. Our Smart Drive 2002 is made from aluminum instead of copper (which is what the new version uses), but it worked just fine.

To install your HD in the enclosure, remove the screws from the bottom of the Smart Drive and pop off the bottom plate. Attach the SATA data and power cables to the hard drive, and then run them through the rear of the enclosure. Put the bottom plate back on, and screw it shut. If you want, you can now install the drive enclosure and the Pioneer optical drive.

We found that even the quiet Barracuda seeks were audible every now and then, so we added a strip of Akasa Paxmate on either side of the drive cage to help dampen the sound even further.



Our Smart Drive 2002 enclosure was actually made for PATA drives, but it works fine with SATA drives, too. If you use the SATA power adapter that comes with the mobo, you don't have to keep the enclosure hooked up to the power supply.

7 Plug In Fans

There are three fans you have to account for in this system. We plugged the Antec 120mm into the SYSFAN1 connector between the CPU and the rear I/O ports. The CPU fan should go into the CPU plug, and the VGA cooler should be plugged into the third power plug on the motherboard located just next to the main power connector. If you're not using the fans we used in this how-to, make sure the fans don't draw so much power that you overload the motherboard.

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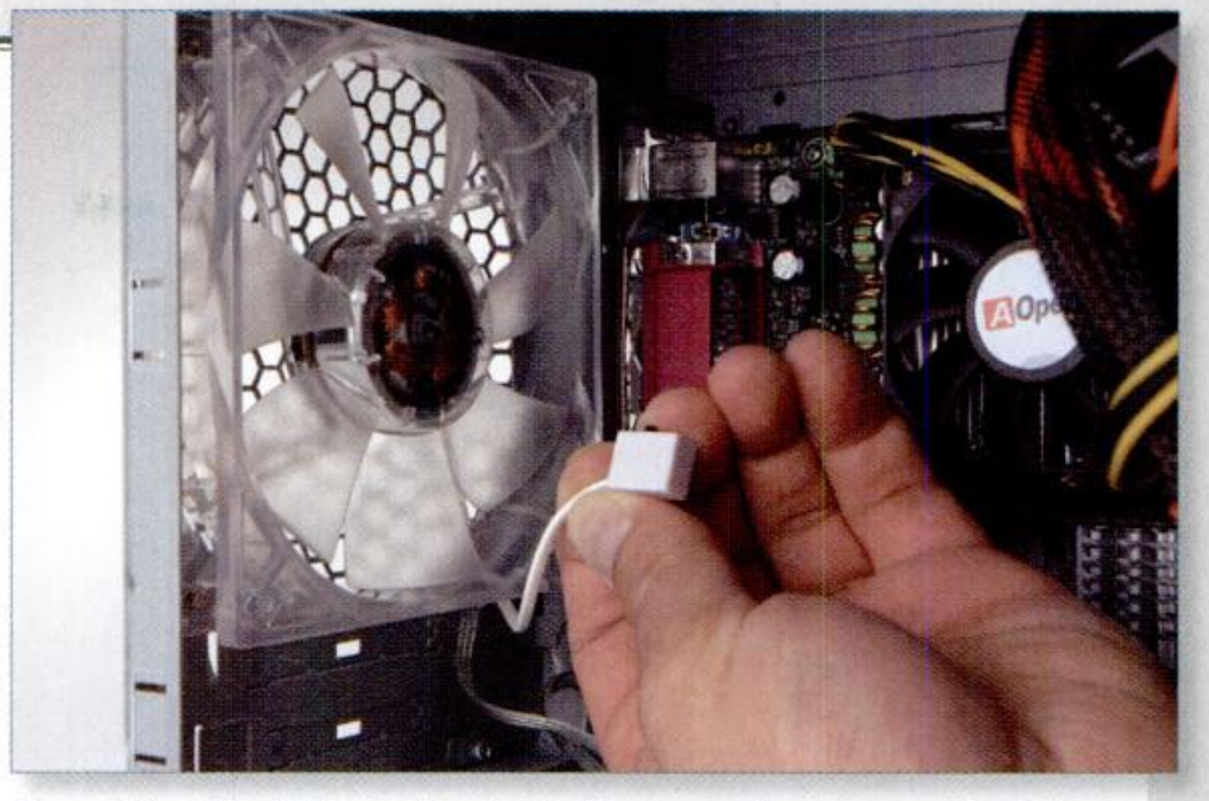
8 Configure the Fans

The AOpen mobo lets you manually configure your fan speed from within Windows XP or from the BIOS. We opted for BIOS control. To set the speeds manually, reboot the machine, enter the board's BIOS, and look for the Silent BIOS category. If you followed our instructions for plugging in your fans, SYSFAN2 will control the speed on the 120mm Antec fan, CPUFAN will set the CPU speed, and PWRFAN will control the fan on the VGA cooler. Change the fan mode from Full Speed to Fixed Speed. You can now set each fan's speed manually.

We found that setting the PSU fan to 66 percent, the CPU fan to 60 percent, and the VGA cooler to 26 percent gave us a good balance between heat dissipation and noise production. Because the Antec TriCool fan lets you manually select any of three fan speeds, we set it on its lowest speed. This eliminates the whoosh noise when the system is turned on or rebooted.

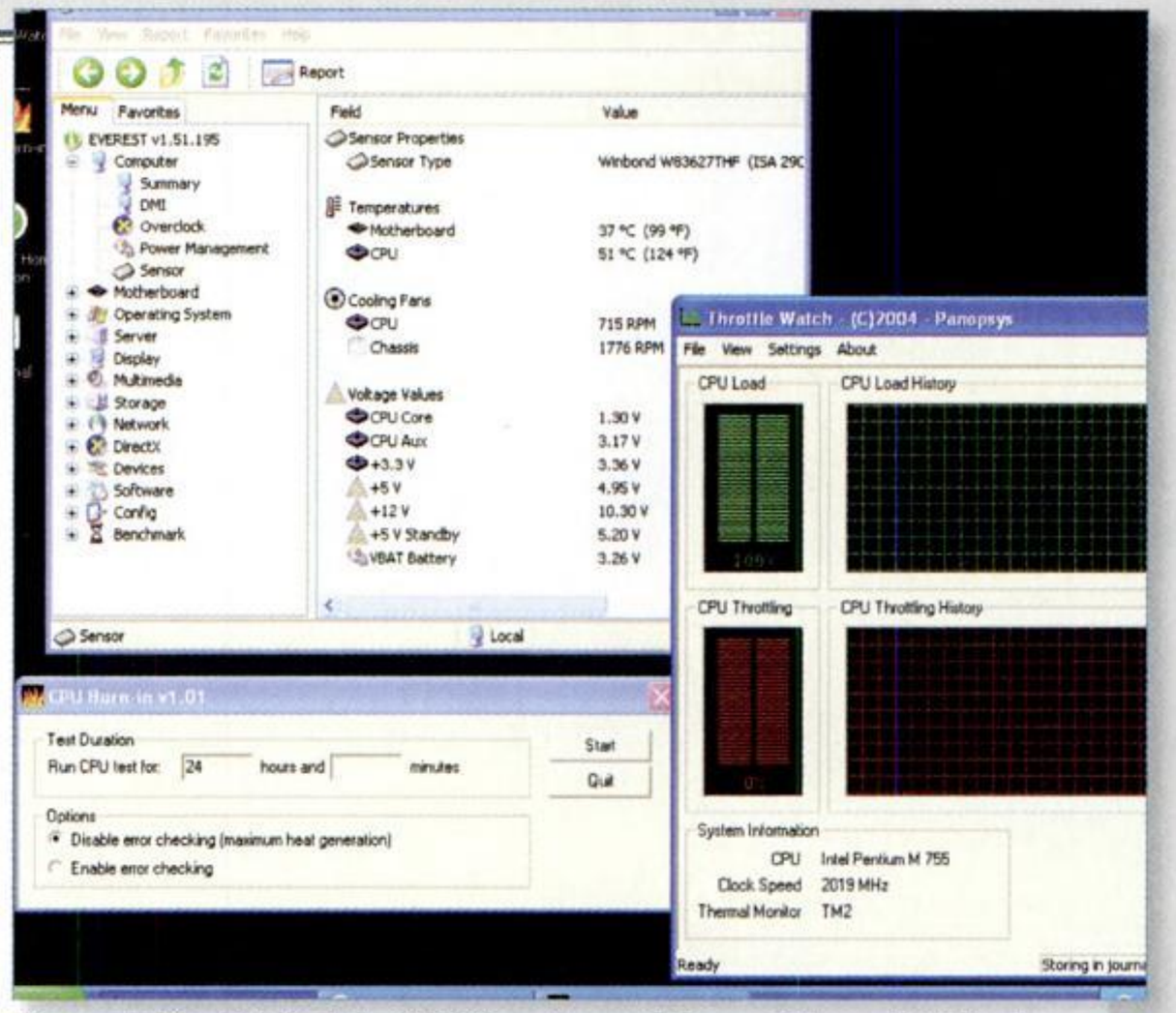


By setting the 120mm fan to its low speed, we prevented the typical whoosh noise that occurs when you reboot or turn on the computer.

9 Test Your Configuration

Because you're running the thermals near their ragged edge, you'll want to make sure you're not overheating the machine. Even if your machine is absolutely silent, it does you no good if it crashes constantly. We grabbed a copy of *ThrottleWatch* from **Panopsys.com**. This utility lets you monitor your CPU load and, more importantly, monitors P4, Pentium M, and Xeon chips for the frequency-reduction that occurs during overheating. (When overheating is detected, your system will trigger these chips' built-in protection and throttle down frequency speed to prevent damage.)

We also suggest you use a CPU-intensive program such as *CPU Burn-in* (**http://users.bigpond.net.au/cpuburn/**) to put a load on your processor for a few hours. You should test your system with the case door on, which is how you'll be using it. We also used *Everest Home Edition* (**www.lavalys.com**) to monitor the CPU sensor temp. If your box is throttling down CPU speeds, you'll have to bump up your CPU fan speeds until it stops. Also consider running a 3D-intensive app such as *3DMark 2003* to see if you can overheat the videocard. FWIW, with our fan settings, we were able to run both *3DMark 2003* and *CPU Burn-in* overnight without video corruption or crashes.



We used *ThrottleWatch, CPU Burn-in,* and *Everest Home Edition* to check whether we had set the fan speeds too low.

What We Learned

The Pentium M 755 is an amazingly cool and fast CPU. Even at 2GHz, the processor's maximum thermal design power is 21 watts. (For the sake of comparison, a 3.4GHz Pentium 4 550 is a 115-watt TDP processor.) While the Pentium M may consume just 21 watts, it's not a weak processor. On the contrary—it's quite fast and gives many desktop processors a run for their money. Unfortunately, we can't say such nice things about the Pentium M's expensive Intel 855 chipset series, which seems antiquated today. The 855 supports DDR333 as its fastest memory and maxes out at 4x AGP, and its ICH4 south bridge doesn't have native SATA support, nor a high-speed interconnect. Of course, the chipset does offer a host of power-saving features, but these have little application on a desktop machine.

We definitely see some use for desktop boards like the i855GMEm-LFS, and hope AOpen continues to explore the category. We see a need for a full ATX version, and we've already recommended a few BIOS tweaks to make the board even better suited for silent computing. If we had to do the project over again, we'd probably go with a 5,400rpm hard drive to cut even more noise. Even with the drive enclosure, the seeks were a tad audible. The Smart Drive 2002 did work, but we're a little unhappy with the build quality of the unit.

And now for the question you've all been waiting for: How quiet was it? Pretty damned quiet. We knew we had accomplished our goal when several editors asked if the PC was running. ■

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The Best of

THE DOC'S A BUSY GUY—HE RECEIVES HUNDREDS OF PLEAS FOR PC HELP EVERY MONTH! WE DIG THROUGH HIS FILES AND PULL OUT HIS BEST TROUBLESHOOTING PRESCRIPTIONS OF ALL TIME

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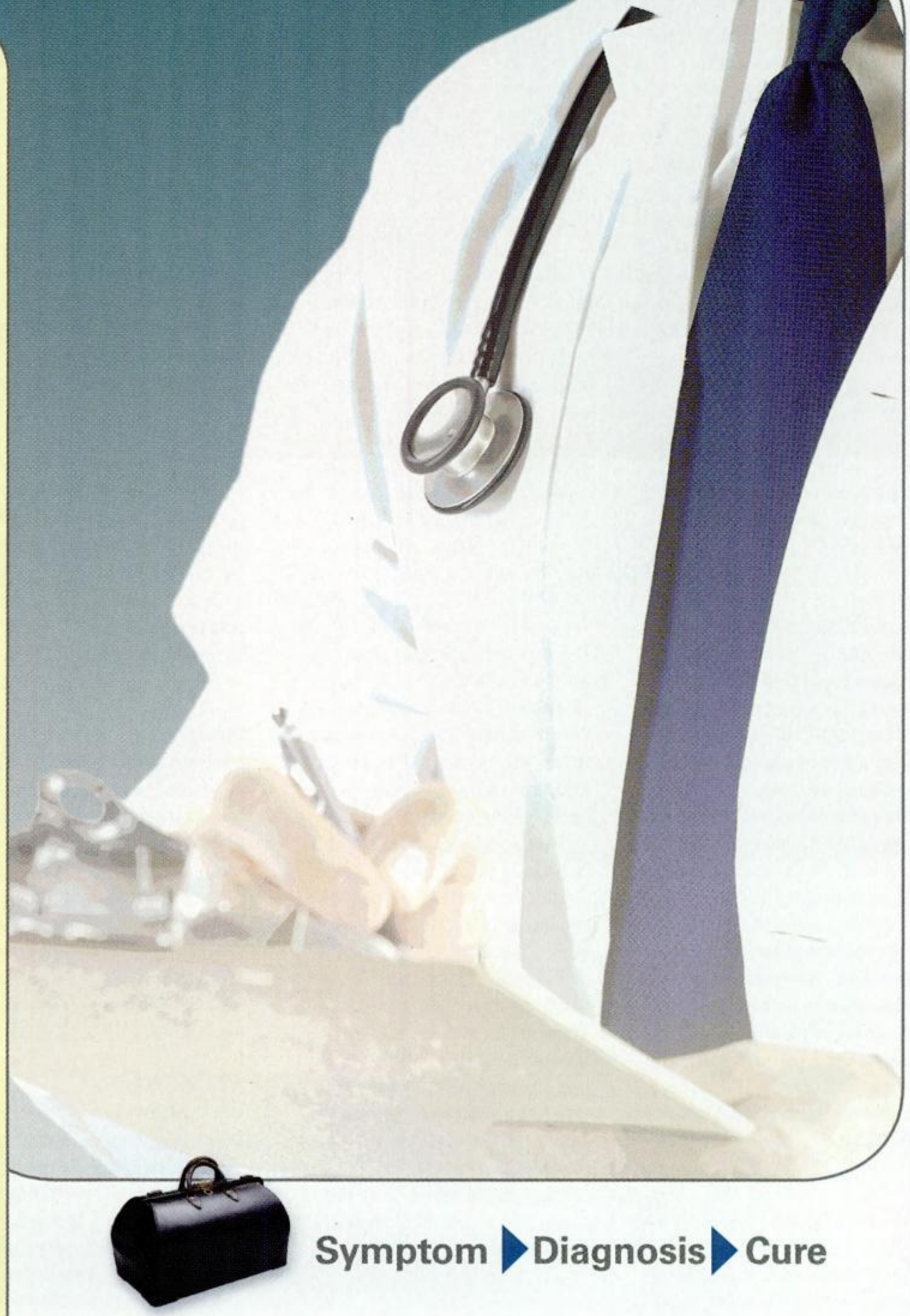

IS TEMP REALLY TEMPORARY?

I'm running Windows 98. I read that you can safely delete the contents of the C:\Windows\Temp folder because the stuff in there is temporary and just takes up disk space. Is this true? Are there any other "temporary" folders and files that can be safely deleted? And can this be applied to Windows 2000 and XP?

—CHRIS LOOI

It's absolutely true. Unless you're intentionally storing stuff in there, the temp directory shouldn't hold anything other than application cruft that you really don't need anymore. Windows XP and Windows 2000 have temp directories for each profile within the OS, so the easiest way to clean them out is to use the Disk Cleanup wizard. You can access it by going to Start>Programs>Accessories>System Tools>Disk Cleanup. It will check all the temp files on your system and delete any excess.

WHEN WINDOWS DUMPS ON YOU

How do I view .dmp files? I keep getting BSODs and I think the cause may be a bad driver. I'd like to pinpoint the culprit so I can update and replace the correct driver; since I've already updated all my drivers, I need to know which one I should roll back. I think the information I need is the C:\WINDOWS\Minidump.dmp file, but I can't analyze it.

—ROB DUTKIEWICZ

The easiest way to peek into a .dmp file is to right-click it, select Open With... and then scroll down to

Symptom ▶ Diagnosis ▶ Cure

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Ask the Doctor

Notepad.exe. The .dmp file will open in *Notepad*, and you'll be able to mull through its contents. If nothing else, you should be able to figure out what application caused the crash, which could help you find the culprit.

ANYWAY?

Does Windows leave any important data in the swap file between the time it shuts down and starts back up again?

I have a dual-boot machine—Windows 2000 Pro and XP Pro—and I often defrag one partition while I'm in the other. Sometimes while doing this I'll just delete the swap file to save time and force Windows to create a new one in a contiguous space. I've not noticed anything odd, or I should say anything beyond the normal Windows odd, but I was wondering if this is a generally bad move.

I know all about *Diskeeper* and its boot-time defragging. I just haven't bothered with it, as this system has worked well for me so far.

—CHUCK SKELTON

There's nothing important saved in the swap file for any version of Windows if you shut down the PC normally. Because the swap file is similar to RAM, Windows doesn't expect to find anything there the next time you reboot. In fact, you can even set Windows to zero out the swap file to obliterate any errant data that might be stored there.

Defragmenting an OS's partition from within another OS is definitely not the recommended procedure, but it works. You might get better results by using a defragger that's more aware of the OS and will place the swap file near the inside edge of the drive platter, where access times are lowest, but that's a minor speed tweak.

MAGENTA MONITOR MONDAY

Recently I installed a new mouse and a Radeon 9800 Pro 128MB. Since I installed this stuff, my monitor occasionally flashes a lovely translucent magenta color. I'm still able to see what I'm doing, but it does become more difficult to run games. This problem can persist anywhere from a minute to a few hours. I have an older Hitachi SuperScan Pro 620 monitor. Is it dying? Or is this a result of a faulty videocard?

—ED12MANY

The very first thing you should do is check both ends of your monitor cable. The Doctor himself has cursed 'failing' monitors several times, only to realize he knocked loose the cable connection on the back of the monitor.

Assuming your monitor cable is actually plugged in—if it wasn't, the Doctor won't tell—there is an easy way to determine which device is failing. All you need to do is connect the monitor in question to another computer. If it's still affected, the monitor is bad. If it's OK, try plugging a different display into the original PC. If that monitor also has a magenta cast, you can safely assume that your videocard is defective. It could also be a faulty monitor cable, but because the problem is intermittent, we think that's unlikely.

CAN'T GET MY GAMES OFF THE GROUND

I just built a PC using an Asus P4C800 mobo, 512MB of RAM, a Western Digital 80GB hard drive, an ATI Radeon 9600, and Windows XP. Whenever I start to play a game, I get about two minutes into the game and it kicks me out to my desktop. I start the game again, and it happens again! Do you have any idea what's wrong?

—SAUL

Sometimes the Doctor feels like he's repeating himself. This kind of "games work for a while, then they crash/my machine reboots/the elves in my computer go on strike" problem is the most common complaint the doctor receives. Almost all these crashes, like the one Steve describes, are caused by one of three things: a heat issue inside the case, a power supply that doesn't provide enough juice, or a user who hasn't installed his motherboard's chipset drivers.

The 9200 isn't as power intensive as some cards, and power supply issues usually result in the machine actually restarting rather than just crashing an application, so we'll scratch the power supply off the list. If you've installed the latest chipset drivers from Shuttle's web site, we can safely assume that your machine is overheating.

To verify a possible overheating issue, run the machine sans case door while playing a game. If your game plays OK without the case door on, you need to improve your case's airflow. Make sure you are sucking air into the case at the bottom and blowing it out the top, and that there are no stagnant areas around your videocard, CPU, and RAM.

If that doesn't work, try removing the CPU heatsink and fan, and then use rubbing alcohol and a paper towel to clean off any residual thermal compound from both the CPU and the heatsink. Finally, reapply new thermal compound and reattach the CPU heatsink. If that doesn't work, you should try upgrading to a bigger CPU heatsink and adding another fan at the top or rear of the case to help move more air.

LEGACY APP WOES

I have used a database program for years, but it won't work with Windows XP. It originally was a DOS program, and there is an updated version that works with Windows 98. I have tried to use the emulator in XP, but the app just won't run. How can I get a Windows 98–compatible program to work with Windows XP?

—RICHARD FERN

Like Kenny Rogers sings, you gotta know when to hold 'em, and know when to fold 'em.... The Doctor

BURNED-CD BLUES

I recently made three CDs for a friend. All three were data CDs containing miscellaneous files and programs. Explorer shows the entire contents of the disk. The disk properties show the amount of data occupying the disk, along with the amount of free space. The used space shows 618MB and the free space shows 654MB, for a total of 1.24 GB. I used Sony CD-R 700MB disks.

When my friend tries to open a file or a directory, or run a program, he gets a message saying there is no CD in the drive, or that the file cannot be opened. The burning software used was *Nero 6*. The drive used was an Artec 48/12/48 CD-RW. Can you tell me what's causing this?

—JACK HILL

There are a number of things that could be going awry here, but the Doctor, who often refers to himself in the third person, thinks that if you and your chum follow these tips, the problem will vanish faster than David Blaine from the public spotlight.

First, make sure you've got Service Pack 2 installed, this massive XP "patch" includes an update that fixes a bug that could prevent your discs from being read in earlier operating systems, and sometimes Windows XP itself.

Second, we found the initial release of *Nero 6* to be horribly buggy. Fortunately, Ahead is very aggressive with updates and product improvements. Go to its web site and download the latest update to *Nero 6*. The update will probably be more than 30MB, but it's worth every bit.

If these fix-its don't solve the problem, the finger of blame is likely pointing at compatibility issues between the media you're using and your friend's optical drive.

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knows it's difficult to bid adieu to an application that's served you well for years, but Richard, it's time.

The sad fact is, some applications work with the Windows XP compatibility tools, and some don't. We recommend you find a way to export your data from your old database app into a more commonly recognized format. Almost every application lets you import from comma- or tab-separated text files, so you should dump your old database into a .CSV (comma separated value) file from a Windows 98 machine, then import it into your new database app.

CLOCK-SPEED CONUNDRUM

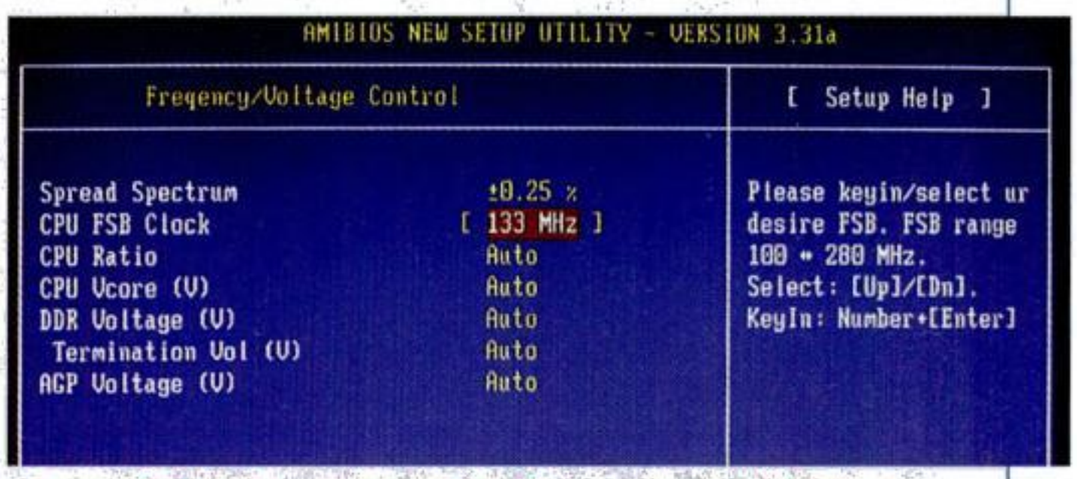
I have a P4 2GHz Northwood A. The PC runs OK, but when I look at the System Properties Control Panel, it says something confusing. At the top it says that I have a 2GHz chip, but right below that it says it's 1.95GHz. What's the story?

—JESSE PETERSON

The likely culprit is a conservatively clocked motherboard. A 2GHz P4A is theoretically the result of a 100MHz frontside bus paired with a multiplier of 20. Not all motherboards will run the busses at exactly 100MHz, though. Intel motherboards, for example, tend to be conservative and generally run the frontside bus (as well as PCI and AGP busses) just under spec at, say, 99.5MHz. This errs toward reliability. Other board makers may actually clock it higher at, say, 100.8MHz, which gives them more performance at the expense of reliability. It's also possible that your motherboard's clock is simply out of whack, leading to the loss of 50MHz. Another outside possibility is that you have a counterfeit Pentium 4, but that's a longshot.

Don't trust System Properties, as it just doesn't provide enough information. Instead, download the excellent (and free) CPU-Z from www.cpuid.com and run it. If the FSB is reported as 98MHz, your board is either intentionally underclocked by the manufacturer, or someone manually set it to the incorrect speed. If it's higher, at, say, 124MHz, you're probably the victim of an unscrupulous vendor who overclocked a 1.6GHz Pentium 4 to 1,984MHz by cranking up the frontside bus speed.

If you're a little confused by CPU-Z, you can also download Intel's free Frequency ID utility (www.intel.com/support/processors/tools/frequencyid/). This utility will verify what CPU you have and whether it's overclocked or not. If it's simply a motherboard that's underclocking the CPU, you shouldn't worry—50MHz won't kill you. If it's overclocked, however, then scream bloody hell.


AMIBIOS NEW SETUP UTILITY - VERSION 3.31a
Freqency/Voltage Control
[Setup Help]
Spread Spectrum ±0.25 %
CPU FSB Clock [133 MHz]
CPU Ratio Auto
CPU Vcore (V) Auto
DDR Voltage (V) Auto
Termination Vol (V) Auto
AGP Voltage (V) Auto
Please keyin/select ur desire FSB. FSB range 100 ~ 200 MHz.
Select: [Up]/[Dn].
KeyIn: Number+[Enter]

If your CPU's clock speed is off, you can check the BIOS to see if your frontside bus speed is correct.

APPARENTLY, I'M NOT SO SMART

Every time I boot, my Pentium 533 displays two messages: "SMART is bad... back up and replace." and "Drive is SMART capable but disabled." What do these messages mean, and what is SMART anyway? I've read my owner's manual and can't find any reference to it.

—KENT MCLEOD

S.M.A.R.T. stands for self-monitoring, analysis, and reporting technology. Basically, S.M.A.R.T. monitors the health of your hard drive and should give you an early warning if your drive is on the brink of failure. The messages you are receiving suggest that one of your drives is failing and the other is not being monitored by S.M.A.R.T. You can turn S.M.A.R.T. on and off in your system's BIOS. The Doctor also recommends that you back up any important data from the drive that S.M.A.R.T. reports as failing.

FORMATTING USB KEYS

I just purchased a PNY Attache 128MB USB 2.0 key drive. I discovered that I can format the drive in one of two ways: FAT16 or FAT32. What would happen if I formatted my USB drive?

I noticed that the drive is currently formatted to FAT. Would there be any speed or storage advantages to reformatting it in FAT32? And why is NTFS not an option?

—IAN J. GINSBERG

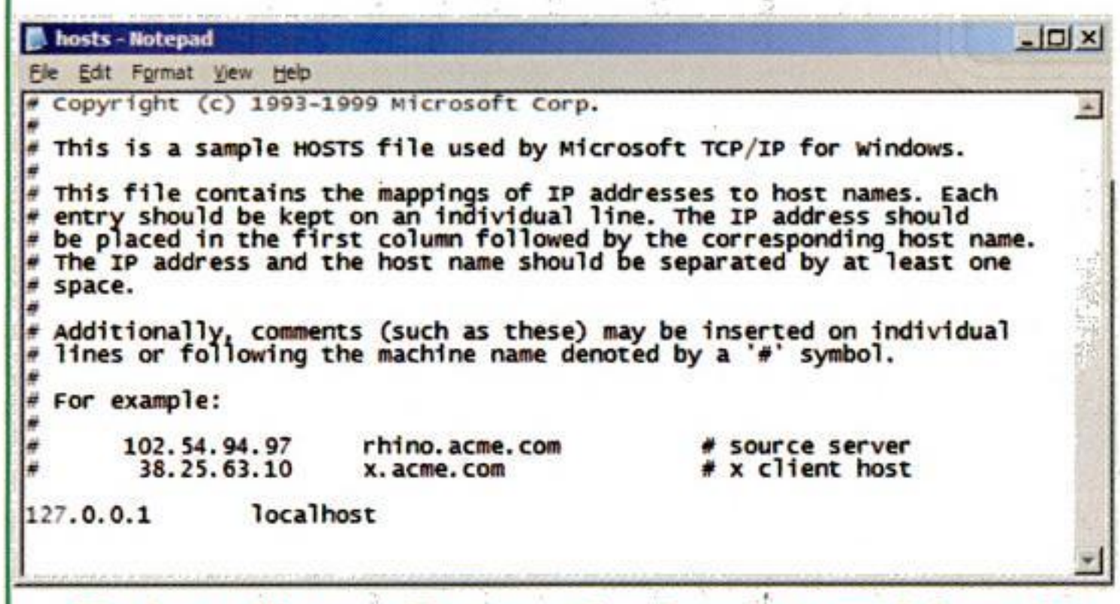
Just as when you format a normal hard drive, the formatting process will erase all the data stored on your USB drive, but it won't do any permanent harm to the drive.

There's really no difference between FAT32 and FAT16 as far as your USB drive is concerned. FAT16 has greater compatibility, but the two versions of Windows that don't speak FAT32—Win95 and WinNT 4—also don't include USB support, so it's a wash. Formatting with FAT32 may limit your disk's Mac compatibility. NTFS isn't an option because Microsoft doesn't allow a removable device to be formatted using NTFS.

HOSTS HOSED ME

My rig was working fine, but lately I've had a problem with *Internet Explorer*. I open it, but can't access any web sites. I look at the status bar to make sure it's trying to load a page, but instead it says "Connecting to site 127.0.0.1" and never loads anything. Am I going to have to wipe my rig and start from scratch to fix this problem?

—SGT. JAMES HOLLIDAY


hosts - Notepad
File Edit Format View Help
Copyright (c) 1993-1999 Microsoft Corp.
#
This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
This file contains the mappings of IP addresses to host names. Each
entry should be kept on an individual line. The IP address should
be placed in the first column followed by the corresponding host name.
The IP address and the host name should be separated by at least one
space.
#
Additionally, comments (such as these) may be inserted on individual
lines or following the machine name denoted by a '#' symbol.
#
For example:
#
102.54.94.97 rhino.acme.com # source server
38.25.63.10 x.acme.com # x client host
127.0.0.1 localhost

The hosts file overrides any other domain name information, regardless of its source. If you've misconfigured the file, you'll have a hard time connecting to the net.

The type of problem you're describing is usually caused by either a network failure or a misconfiguration of a special file called the "hosts" file, or occasionally the "lmhosts" file. The hosts file can be used for basic network configuration, but most users have a single entry in it configuring their machines to use the local host IP address of 127.0.0.1.

The Doctor's best guess is that you've inadvertently misconfigured your hosts file. Because typing any URL into your browser directs you to 127.0.0.1, we bet your hosts file is making your PC think that every URL on the Internet is 127.0.0.1. In Notepad, open the hosts file (it's usually in C:/Windows someplace, but you may have to search for it) and remove all the entries except for the "127.0.0.1 localhost" entry. Do the same thing for the lmhosts file, if your machine has one, and then reboot your PC. That should fix it.

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Ask the Doctor

EXTERNAL VS. INTERNAL

In an article in December 2003's *Maximum PC*, you stated: "We've found that external drives have a significantly shorter life span than internal drives." Can you explain what you meant by "significantly shorter life span"? Also, how does the life span of an external drive compare with that of an internal drive, and is there anything I can do to extend the life of my external drives?

—THOMAS QUAN

External hard drives are exactly the same mechanically as their internal brethren, so their life span should be the same. But often that's not the case. Think of it this way: An internal hard drive lives a life of luxury. It sits securely in its drive cage fastened down on all sides and totally sheltered from the cold, harsh realities of the real world. Its chances of getting bumped, knocked, dropped, or dunked are almost nil. On the other hand, an external drive hangs out in the middle of the combat zone known as your desktop. Plus, most external drives are not designed to be portable but are often used in that fashion. So the best way to prolong your external drive's life is to keep it out of harm's way. Don't carry it around with you or toss it into a book bag. If you treat your external drive like an internal drive and practice care and caution when handling it, it will live a long, uneventful life.

PERFORMANCE IN DIFFERING RAM CONFIGURATIONS

I'm planning to build a new system using an Abit IC7-Max3 motherboard, an Intel P4 2.6GHz processor, and 1GB of Corsair XMS PC-4000 RAM. The Abit board has four DIMM slots and I want to know if there's a performance difference when using two 512MB sticks versus four 256MB sticks? Which would be better in terms of latency, resources, and game performance?

—JOE JANNISE

You're unlikely to see any practical performance difference from running two sticks versus four sticks. Personally, the Doctor would rather have two 512MB sticks because it leaves room for additional RAM down the road. Latency isn't an issue in these DIMMs: you can buy 512MB sticks these days that have just as low a latency as the 256MB sticks.

CD-BURNING BLUES

I own a Shuttle SB61G2 system and am having problems burning audio CDs with the Lite-On 48x CD-RW/DVD combo drive. Recently, I've been having problems getting *Nero* to burn a useable CD. The drive will spin up and begin burning but it does so at a much slower rate than it used to. It also makes a lot more noise while it's spinning, and it takes about two minutes longer to finish a CD.

Worse yet, when I put the completed disc into a CD player, there's a ton of background noise on the tracks and some songs either skip or won't play at all. What is causing this behavior?

—DOMINIC ST. PIERRE

Frankly, what you're describing sounds almost like death throes. But don't give up hope yet. First, update the firmware to the latest version (see your documentation for instructions). Make sure it's the correct firmware version so you don't end up in Draklyne's shoes. If that doesn't help, try disabling *Nero*'s Smart-Burn feature, which some readers have had problems with. Go to Recorder > Choose Recorder, select your drive from the window, then click the Options button, and uncheck "Smart-Burn enabled." If you continue to have problems, try using different media, preferably name-brand media recommended by your documentation.

Also, you might try updating your chipset drivers, but that solution is a longshot.

ASK AND YE SHALL RECEIVE

I use Windows 2000 on most of my computers. Are there *PowerToys* available for that version of Windows? If not, will *PowerToys* for another version of Windows work with 2000? Are there other sources for free programs like *PowerToys* elsewhere?

—REV. RONALD F. WALTERS, OFM

We've got good news and bad news for you, Reverend. There are no specific *PowerToys* for Windows 2000 with the exception of TweakUI, which is actually the most useful of them all. The NT version is labeled *Tweak UI 1.33* and is available at www.microsoft.com/ntworkstation/downloads/PowerToys/Networking/NTTweakUI.asp. The XP *PowerToys* are not designed to work with earlier versions of Windows. We've heard of people having some success running the XP utilities on Win2K, but have not confirmed this ourselves.

A tweaking utility we can vouch for, though, is X-Teq's X-Setup, available at www.X-Setup.net (And it's on the disc!). It offers a dizzying assortment of hidden tweaks and system settings, and is supported by all versions of Windows. The latest version is *X-Setup 6.6*. Like *PowerToys*, *X-Setup* is free software.

CAN YOU HEAR ME NOW?

My PC has an Asus A7N8X Deluxe mobo with an Athlon XP 2700+. I'm considering adding an Audigy 2 soundcard to my system, but I wonder if I will hear and see any sort of performance difference compared with the nForce2 onboard audio. Will I get faster frame rates?

—VICTOR KNIGHT

The Doctor generally recommends add-in soundcards over onboard audio except when there's an nForce2 involved. While most onboard audio is host-based, and thus soaks up CPU cycles, the nForce2 features true hardware

The Google auto-fill feature is safer than most, but the Doctor really doesn't see the point of using any form of auto-filling software.

IS GOOGLE'S AUTO-FILL FEATURE SAFE?

How safe is the auto-fill feature on the Google toolbar? Is there any possibility of hackers getting ahold of my personal information if I use this feature?

—BENJAMIN VILLEGAS

Google's feature is as safe as any other information stored on your computer or in any other kind of auto-fill software, including the software that's built into Internet Explorer. By "personal information," we assume you mean credit card numbers. If anyone you don't trust has access to your PC, or if your PC is in an insecure location, you should avoid using auto-fill for credit card info.

As a general rule, we find that auto-fill is an annoyance, especially if you have more than one address you use on a regular basis. Taking an extra three seconds to type your information into a page that asks for it is much better than finding out your new PC upgrade was accidentally sent to your old office because your auto-filler put in the wrong address.

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acceleration, so you're not likely to see any advantage at all to using an add-in card.

The nForce2's MCP-T south bridge chip is also the only product on the market that encodes audio, including DirectSound3D, to Dolby Digital. However, there may still be a reason to upgrade to an Audigy card. Creative's Audigy 2 ZS uses components capable of 24-bit audio and uniquely includes hardware security that lets you play DVD Audio discs. The Audigy 2 ZS also lets you run eight-channel audio versus the six-channel audio of the A7N8X Deluxe. To the Doctor's ears, the 24-bit sounds cleaner than the A7N8X Deluxe when using high-resolution samples. For most material, you'll probably never notice the difference.

MOUSE HUNT

Whenever I'm working on my computer, my mouse cursor will decide to run off on its own, usually to the top corners of my desktop. During a game, my character will randomly spin around in circles and I end up shooting at my own feet. I've tried different mice, on all of my USB and PS2 ports, and nothing helps. Thing is, I don't experience this problem when I use a joystick.

—LYNN ROBERTS

The Doctor had this exact same perplexing problem when he first started playing Battlefield 1942. The solution is simple: Try unplugging your joystick when you're playing games that don't require it. Odds are that something is knocking the joystick off-axis and causing your uncontrollable spin.

INSTALLING WINDOWS XP FROM AN UPGRADE CD

Can I do a full install of Windows XP on a clean hard drive if I use an upgrade XP version? I want to start from scratch with a new drive and not have to install Windows 98 first.

—RICK LEES

> ***"WHENEVER I'M WORKING ON MY COMPUTER, MY MOUSE CURSOR WILL DECIDE TO RUN OFF ON ITS OWN, USUALLY TO THE TOP CORNERS OF MY DESKTOP. DURING A GAME, MY CHARACTER WILL RANDOMLY SPIN AROUND IN CIRCLES AND I END UP SHOOTING AT MY OWN FEET."***

You never need to install an older version of Windows in order to upgrade it with a newer version. If you use an upgrade version of Windows XP on a blank system, Windows will prompt you to insert a valid Windows 98, ME, or 2000 disc near the beginning of the install process, but that's only to identify the previous version, not to install it.

WINDOWS XP ACTIVATE!

I am always tweaking my computer with hardware upgrades. Now it's reached a point where whenever I make a hardware-related change to something in my computer, I have to reactivate my copy of Windows XP. This was fine the first few times when I could do it online, but now I have to call to get the activation code. I know this is to prevent piracy and to prevent users from loading the software on more than one computer, but I'm always making some type of change to my computer and it's getting rather annoying. Is there any way around this?

—JEFF MOORE

Unfortunately, there's no legitimate way around Windows XP's product activation. But we're curious how frequently you're upgrading your hardware to encounter constant reactivation requests?

On our test systems, the only way we can force a reactivation request is to upgrade a lot of hardware. For instance, we've seen activation requests when we upgraded more than two of the following: motherboard, CPU, network card, and hard drive. Even *Maximum PC* editors stick with a system for at least six months.

VARIABLE VS. CONSTANT BIT RATE MP3S

I'm looking to rip my entire CD collection so I can use my PC to listen to several hours of music without having to swap CDs. And I'd like to be able to transfer a selection of songs to an MP3 player for listening to while on

IS MY HEADPHONE JACK VESTIGIAL?

I can never seem to get the headphone jacks to work on my CD/DVD-ROM drives. Does something have to be enabled to get them to work? Is there a cable that I need to split to run to the audio on the back of my computer and then back to the CD-ROM drive? Why would they put a jack on the front of my drive if it doesn't do anything? Are they just screwing with my mind?

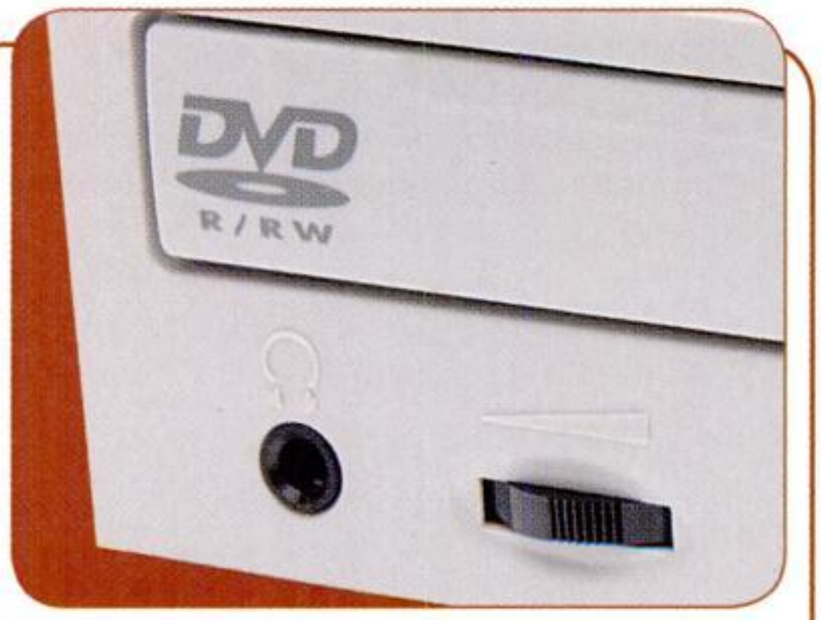
—JOSH RIBBLE

The headphone jack is a vestigial organ from the Windows 3.1 days, when most people weren't blessed with soundcards. But optical drives did have inexpensive, built-in digital-to-analog converters that could take the digital signal from a CD, convert it to an analog signal, and send the output to your headphone jack. Suddenly, you had an instant CD player. Very cool.

But as you've noticed, the headphone jack doesn't do much these days. In fact, you won't even get any sound from it with most system configurations. That's because your soundcard and operating system have teamed up to create a digital, as opposed to analog, path from your audio CD all the way to your speakers. If you want to listen with headphones, use the line-out jack on your soundcard. If you don't have a breakout box that brings the line-out to an accessible spot, you can buy a headphone extension cord from Radio Shack for peanuts instead.

If you're determined to use your optical drive's headphone jack, it's still possible—you just have to get your analog signal back. In XP, right-click My Computer, select Properties, and click Device Manager. On the device list, click the + sign next to DVD/CD-ROM drives, and right-click the drive you want to plug your headphones into. Select Properties from the menu, then click the Properties tab. Uncheck "Enable digital CD audio for this CD-ROM device." Your headphone jack should now work.

If you want to be able to play the audio through your PC speakers and headphones interchangeably without having to dig up this checkbox, you'll need to connect the analog-out from your optical drive to the analog-in on your soundcard using a special two-pin cable that should have come with your drive. Check your drive's documentation to find the analog-out on the back of the device.



The headphone jack works only if your optical drive is configured to use the analog output for audio. It won't work if you're digitally extracting audio to listen to CDs.

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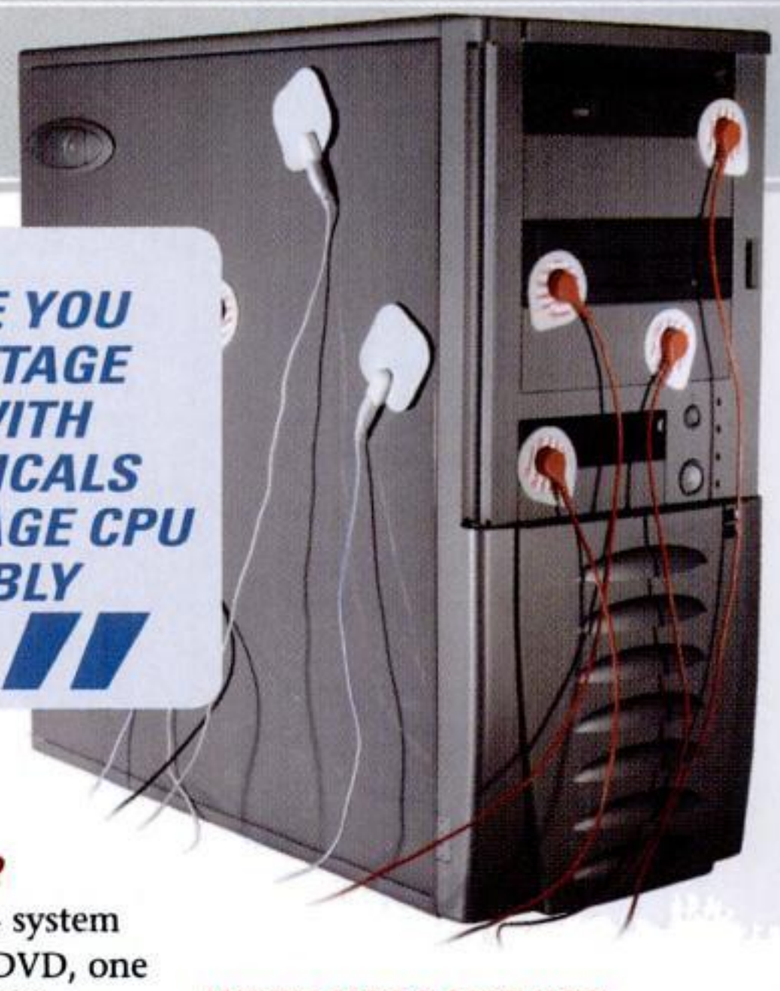
Ask the Doctor



> **"IT CERTAINLY SOUNDS LIKE YOU HAVE FINALLY REACHED THE WATTAGE LIMIT OF YOUR POWER SUPPLY. WITH FIVE HARD DRIVES AND TWO OPTICALS (NOT TO MENTION A HIGH-WATTAGE CPU AND VIDEOCARD), YOU'LL PROBABLY WANT NO LESS THAN 450 WATTS."**

the go. I've heard that ripping using a variable bit rate offers the best quality, but that ripping using a constant bit rate ensures the best compatibility with MP3 players. Is that still true with today's newer MP3 players? I'd be looking to buy either an Apple iPod or a Creative Labs MuVo NX.

—MARC WAUGH

You heard correctly, Marc. Bit rate refers to the amount of information recorded for every second of audio. The higher the bit rate, the closer the sound will be to the source audio. Constant bit rate recording (CBR) captures the same amount of information throughout the entire song, be it 128Kb/sec, 160Kb/sec, or higher. Variable bit rate recording, on the other hand, throttles up the bit rate during complicated parts (loud, distorted guitars, orchestras, that kind of thing) and lowers the bit rate during less complicated passages (like silence, for example). The purpose of variable bit rate encoding is to reduce the size of an audio file as much as possible while still maintaining good audio fidelity.

We strongly recommend variable bit rate recording. But you're right to be cautious about VBR support in portable players. For example, Apple's iPod and Creative Labs' MuVo NX support VBR-encoded MP3s but older players may not.

VEXING VIRUS

I'm running Windows XP. I installed *Norton Anti-Virus* and it detected a virus in my C: windows/system32/smrssm.exe file. The name of the virus is Backdoor.Cybspy and I can't delete it. How do I get rid of it?

—JOHN FRANKLIN

This one's a little tricky to get rid of. First, make sure your antivirus definitions are up to date. Run a full system scan and delete any files detected as the virus. Open RegEdit and delete the value MSWINCFG from the keys: HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Run and HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\RunServices.

Backdoor.Cybspy also deletes the file Netstat.exe, so if you use that, you'll need to restore it from your Windows XP disk. (You can restore missing or broken XP files by booting off the XP install CD and choosing "Repair Windows XP" when prompted.) This nasty bugger contains a keylogger, so you should definitely change all of your important passwords from a safe computer immediately.

WHY ALL THE DRIVES?

I'm running an Intel P4 system with seven drives: one DVD, one CD-RW, one 80GB ATA133, two 120GB ATA133s, and two 160GB Serial ATA. My system keeps restarting randomly ever since I added the last two Serial ATA drives. What's the minimum wattage power supply I should have? And what manufacturer would you recommend?

—CHRIS

It certainly sounds like you have finally reached the wattage limit of your power supply. With five hard drives and two opticals (not to mention a high-wattage CPU and videocard), you'll probably want no less than 450 watts and preferably from a reputable vendor. PC Power and Cooling offers one of the best power supplies on the market with its TurboCool 475 Deluxe. If you're a little money-shy, consider an Antec or Enermax PSU. Just make sure the system is kept cool: As the temperature increases, the power output from the power supply decreases. n

WHEN MOBO MET USB

I recently built a new rig with an Asus A8V Deluxe mobo. Whenever I plug in my external USB hard drive, or boot or restart my PC with the USB drive plugged in, the BIOS automatically switches the boot drive to the USB drive. I updated the mobo with the newest BIOS version and the same thing happens. I never had this problem with previous mobos and no one seems to have an answer for me. Can you please help?

—SCOTT REIMER

The Doctor doesn't have that particular motherboard handy to test, but we do have a few tips you can try. Go into the BIOS and look for the boot options screen. Disable the option to "Boot other device." You should also move the USB drive to the back of the boot sequence when it's plugged in. This usually works

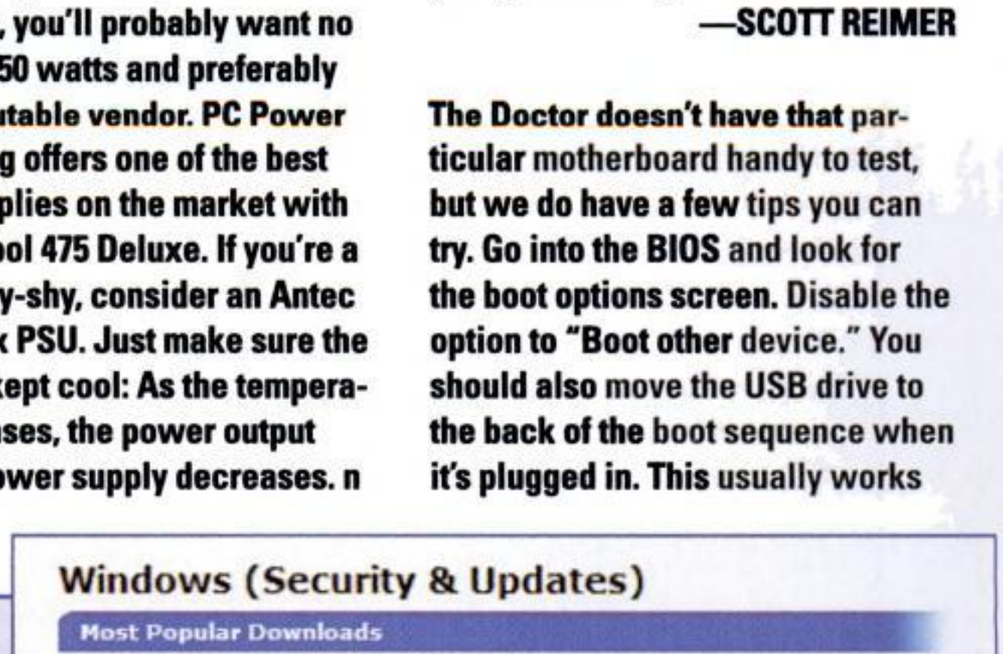
SAVING PATCHES AND HOTFIXES FOR LATER

I have a question about patches and hotfixes. I thought I could download all the patches to a directory and apply them whenever I wanted. Instead, the apps always install themselves at download, and I have no idea how to save them for some future date when I may wipe my hard drive, reinstall Windows, and then reinstall all the fixes without having to download them again. Is this possible, and if so, how?

—JOE ZINSKIE

You need to visit the Downloads section of Microsoft.com, click the "Windows (Security and Updates)" option on the left side of the page and download all the updates listed (you'll need to click the "Next 45" link to see them all). The Doctor recommends you download all the security updates for your version of Windows to one folder. After you've done that, you can save them to whatever format you'd like. Or you can add them to a slipstream CD—see page 72.

If you find yourself frequently installing Windows on new machines, you can save yourself a lot of downloading hassle by keeping copies of all the Windows patches on a CD.



Windows (Security & Updates)

Most Popular Downloads

1. Mydoom (A, B) and Doomjuice (A, B) Worm Removal Tool (KB836528)
2. Security Update for Windows XP (KB823980)
3. Internet Explorer 6 Service Pack 1
4. Blaster Worm Removal Tool for Windows XP and Windows 2000 (KB833330)
5. Cumulative Security Update for Internet Explorer 6 Service Pack 1 (KB832894)

⊟ Next 45

6. Security Update for Windows XP: KB828028
7. Security Update for Windows 2000: KB828028
8. Security Update for Windows XP 64-Bit Edition (KB823980)
9. Security Update for Windows 2000 (KB823980)
10. Security Update for Windows XP (KB824146)
11. Cumulative Security Update for Internet Explorer 6 (KB832894)
12. Security Update for Microsoft Windows 98 and Windows 98 Second Edition (KB823559)
13. Windows XP Home Edition Utility: Setup Disks for Floppy Boot Install
14. Software Update Services 1.0 with Service Pack 1

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better than removing the drive from the boot sequence.

Your last resort is to disable the option to boot from USB devices entirely. That will definitely solve your problem!

WATCHING LIVE TV VIA WI-FI

I recently created a Wi-Fi network and I want to know how I can use it to watch television off a Media Center PC, in real-time, on another computer on the network. Specifically, I want to watch a TV show (not already recorded) on a Tablet PC in another room. Everyone agrees that Windows XP Pro should be able to do this, but no one knows how to accomplish it. Watching recorded shows, playing MP3 files, and sharing items from the hard drive is no problem, by the way.

—NEIL G. POWELL

That's exactly the kind of feature Windows Media Center PCs need, but as far as the Doctor can tell, there's no way to enable it with this build of the OS.

We've had great luck in the past using *Beyond TV 3* (the software formerly known as *SnapStream*). Using the app on a normal TV via a tuner card, you can stream live or recorded TV programs to a wide variety of devices, from laptops and set-top boxes to Pocket PCs. A demo is available at www.snapstream.com.

THESE FRAGS ARE PILING UP!

I just purchased *Diskkeeper Pro 8.0,* updated it to the latest version, and ran the program to defrag my hard drives. Unfortunately, with just 28 percent completed, I got a blue screen with the error: IRQL_NOT_LESS_THAN_OR_EQUAL, and my machine rebooted. I thought it might be a driver problem, so I updated all my drivers, as well as *PC-cillin,* which I had installed the day before. Is there a conflict between *PC-cillin* and *Diskkeeper Pro*?

—RUETZ300

The Doctor is not aware of any conflict between those two programs. However, it's not a bad idea to uninstall *PC-cillin* and see if *Diskkeeper* completes successfully.

It's much more likely that a failing hardware component is to blame. The error message you received is frequently associated with a faulty or failing RAM chip. Try pulling each chip in your system one at a time and running *Diskkeeper.* If it completes successfully with one stick, but not with another, you've pinpointed the culprit.

There's also a slim chance your hard drive is having problems. The Doctor recommends doing a full surface scan on the disk ASAP. You can do that by opening the run menu (Windows key + r) and typing `chkdsk c: /r` and rebooting.

PUTTING LOST CLUSTERS WHERE THEY BELONG

When a lost cluster is found via checkdsk or Norton Disk Doctor, it's saved to a folder as a file named something along the lines of "found001." On many occasions I have identified the fragments recovered and been able to manually return them to where they belong. Sometimes they even work. On other occasions, I get a "found file" whose original path is unknown and I have no way to replace it properly, so it resides in its odd folder until the next format and clean install. Is there a reliable way to restore that found file to its proper place?

—GREG HAVENS

Lost clusters used to be a much more common Windows file system error, mainly because older versions of Windows crashed so often. Lost clusters occur when your operating system's file allocation table (FAT) thinks a certain sector of the hard drive is in use when it actually isn't. Say you're working on a Word document, and your system crashes or you close the program before your worked is saved. The FAT entry for that file consists of a chain of references that point to the file you are using, but a spontaneous system crash can break this chain and orphan the clusters connected to the original document.

Once lost clusters have been created, you have a few options for dealing with them. First, most file scanning utilities will give you a chance to save the entries before they're zeroed out in the FAT. Scandisk will automatically assign it the name FILE001.chk, and sometimes you can even open these files and retrieve data from them. If a file is inaccessible, it's likely a binary file that needs every piece of the original file in order to be opened.

The best way to avoid this whole situation is to upgrade to an OS with an NTFS file system. It provides internal redundancy for the files, so in the event of a crash (which happens rarely) files can be re-created with ease.

TRAPPED IN THE PAST

I have tons of cassette tapes I'd like to transfer to CD, but my boom box doesn't have an RCA audio output. For that matter, none of the new cd/cassette boom boxes on the market have one either! How do I solve this problem using my desktop or laptop with my boom box?

—BOB MCELWAIN

You're boom box should at least have a headphone jack. You could use that to pipe audio to your PC via a patch cable—available at Radio Shack or another electronics store. If your boom box has a 1/4-inch headphone jack, make sure to also buy an adapter so you can plug one end of the cable into the headphone jack and the other end into your soundcard's smaller audio input jack (it's sometimes labeled Line-in).

Once that's done, you can use *Sound Recorder,* which comes with Windows, to record a .wav files of each track. You can then compress the .wav file to an MP3 or WMA file using your normal jukebox app. If this seems like too much work, there are several software packages that will automate the process for you, but the Doc hasn't tested any of them enough to make a recommendation. You should download trial versions of a few different programs and see how they work.

Additionally, using an amplified output to record audio isn't ideal, but if you tweak the volume level on the boom box, you should be able to get an acceptable recording. The Doctor doesn't think the quality level of the old analog tapes is high enough to justify spending more money on a cassette deck with line outputs.

JUST CALL HIM "THE DUDE"

Is there a utility that will tell me how many watts my power supply is providing and how many watts my system is using? I've added several lights to my case and want to know if I've overtaxed my power supply.

—DUDE COOPER

Unfortunately, we haven't seen any utilities that do this, and we're not sure it's possible without purchasing extra hardware. Some motherboard monitoring software lets you

SECOND OPINION

POWER TRIP

I was just reviewing one of my *Maximum PC* issues and noticed your suggestions about power supplies and power strips. I have a bone to pick with you: You should never recommend a power strip for your PC. If you look closely at a power strip, most have a circuit breaker designed to protect the wall socket and wiring but not the PC. And most of those cheap strips have little or no surge protection, not to mention noise suppression, etc. When talking about PC protection to anyone, I recommend a good battery-backup unit that not only provides battery backup when the power goes out, but also protects during brown outs, suppresses line noise, and offers surge protection and a modified sine wave. Good units start at about $40, while a very good surge strip is just a few dollars less. In the last few years, I've solved many PC problems with a good backup unit.

These days, if I come across system problems, I check to see what kind of power protection it has first. If a PC doesn't have a good backup unit, I install one before I do anything else.

—JEFF NOTT

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see how much voltage the power supply is putting out, but it doesn't tell you how much actual wattage is being used.

To see how much power your PC is using, we recommend Watts Up? Pro from www.doubleed.com. This device plugs into your PC (or any other electrical device) and lets you monitor the wattage consumed, the voltage, and a plethora of other electricity-related stats. The Pro version also logs the data so you can generate nifty charts and graphs of your PC's power consumption.

MADDENING MONITOR MOVEMENT

I just moved and reconfigured the basement to be my office. The only problem is that both of my monitors (Viewsonic P810 and G790) have quite a bit of warble on the screen. They never did this in my old house. The only things anywhere close to the monitors are two A/C units outside the wall and two furnaces about 15 to 20 feet away.

The weird thing is, it doesn't matter if everything is turned off. The screen still shakes! I tried degaussing both of them, and tried a bunch of different resolutions and refresh rates, with no difference! Are there any other things to look out for, or is there any kind of extra shielding I could buy to protect the monitor?

—STEVE KLEIN

Visual distortion on a CRT's screen is usually the result of interference from another device. The interference could be electromagnetic in nature, meaning there's a buildup of magnetic radiation within the display or in its general vicinity, which deflects the electron beams and produces a distorted image, typically characterized by discoloration or a rainbow effect. Degaussing, which you've done, is one way to troubleshoot that problem. Another is to move your monitor to various locations, away from any potentially conflicting devices, such as speakers, fans, *or even another CRT*.

A "warble" seems more indicative of electrical interference. It's possible another device on the same electrical circuit is affecting the monitors; perhaps there are even line-noise problems in your new house. Plug the monitors into a different electrical circuit or isolate the monitors and your PC on a circuit by using a power protection device that includes line filtering—cheap surge protectors don't do line filtering, but most battery backups do. If that doesn't help, you may want to purchase a circuit tester (about $5 at Radio Shack) and check your outlets to make sure they are properly grounded.

If you didn't take electronics in high school or don't feel comfortable sticking a probe into your wall socket, you should probably call an electrician.

A BUFFET OF BUFFERS

What's the difference between a 2MB hard drive buffer and an 8MB hard drive buffer? And how come there aren't any 4MB or 6MB buffers?

—ALAN MICHAUD

The difference in performance between a 2MB buffer and an 8MB buffer can be substantial. We've run tests on both configurations and found that on average, a drive with an 8MB buffer can deliver up to 30 percent higher performance than a drive with a 2MB buffer. This is because reading from a drive's onboard memory is significantly faster than the time it takes a hard drive's heads to position themselves over the correct sector, wait for the data to arrive, and then read it. In other words, transferring data from memory is a lot faster than relying on a hard drive's mechanical apparatus to fetch it.

There are two reasons why today's hard drive buffers are only available in 2MB and 8MB capacities. First, the market is generally divided into two segments—performance drives and budget drives. Drives that fall into the budget category compete on price rather than features; a minimal 2MB buffer keeps the cost of production down.

Performance drives, on the other hand, are all about the whiz-bang features such as fluid dynamic bearing spindle motors, rotational vibration adjustment technology, and whopping 8MB buffers. Price takes a back seat to all the extra advantages this class of hard drives offers.

The other reason we don't see drives with 4MB or 6MB caches is that there generally wouldn't be enough of a performance increase from a 2MB cache to justify the significantly higher cost. Like we said before, hard drives are typically split into two camps: performance and budget drives. A drive with a 4MB or 6MB buffer would be stranded in no-man's-land directly between these two market segments. Following this same logic, it's doubtful we'll see upcoming hard drives boasting 10MB or 12MB buffers, but 16MB is certainly a possibility.

SECOND OPINION

I have to disagree with your March 2004 solution to Richard Fern's "Legacy App Woes." If you want to get a DOS program to run in Windows, you should download DOSBox (dosbox.sourceforge.net) and run it with the program in question. DOSBox is capable of running a ton of DOS programs in Windows XP. The only problem is that the sound is distorted when you try to run a program at more than 5,000 cycles per millisecond, but that shouldn't be a problem for a database program.

—ZACK GREEN

DVD HELTER SKELTER

I bought an All-in-Wonder 9600 Pro videocard and started recording video from the television and burning the programs to DVD. I found that the shows' audio was out of sync with the picture. I have changed burning software and editing software to no avail. How do I fix this problem?

—PMANNFURY

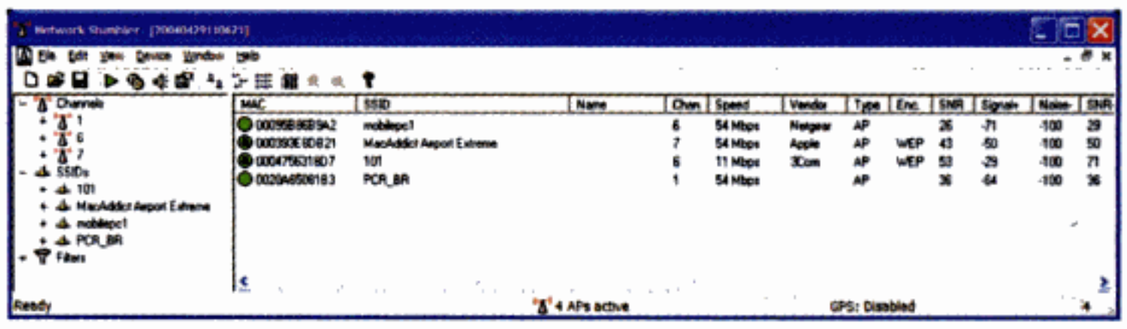
There's no easy way to fix audio/video sync problems once a video

NO MORE NEIGHBORING WIRELESS NETWORKS

My wife and I share a broadband connection over a Linksys 802.11g wireless router. We recently moved and now my wife's laptop picks up a neighboring wireless network; every 15 minutes or so, she gets interrupted with a message that says "Multiple networks found," and she is forced to reconnect to our network. We have our network set as the default but we can't seem to filter out this neighboring network.

How can we screen out the neighboring network so her computer will stop getting confused?

—DAVE GELLERMAN



NetStumbler lets you know if any other wireless networks in your neighborhood are affecting your reception.

Try changing the channel that your access point uses. Open up your router's web configuration page—it's usually at http://192.168.0.1 or http://192.168.1.1—and go to the Wireless tab. The channel setting typically defaults to 6, which creates annoying competition among any access points in the same range. Try to set your access point to a channel that's at least two channels away from your nearest neighbor.

How can you find out what channels your neighbors' wireless networks occupy? That's easy. If you have a supported Wi-Fi chipset, you can just download NetStumbler (www.netstumbler.com) to sniff your neighborhood and see whose AP is hogging your airwaves.

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has been created. A utility like *VirtualDub* (free at www.virtualdub.org) can do it, but it can be challenging to use, so you'd *really* have to want to salvage that recording to make the hassle worth your while.

Preventing the problem from occurring in the future is another matter. Believe it or not, the most likely culprits are a drive that's too slow or heavily fragmented, or too many background applications running during recording (especially file-sharing applications that continually lean on the hard drive). Make sure to shut file-sharing apps before you begin recording, and defrag your hard disk regularly.

You might also consider recording to a hard drive partition that's not frequently accessed, or better yet, a separate physical hard drive altogether. A 7,200rpm hard drive is the bare minimum we'd consider for video capture. They're cheap enough these days to add a second drive dedicated solely to vidcap.

PARDON MY PARTITION

I'm installing Windows on a new computer, but I can't format a partition bigger than 137GB. What's up with that?

—MATT YOUNGBLUT

This is a problem with pre-SP1 versions of Windows that are unable to address more than 137.4GB of a hard drive. We ran into this problem in the old days at 504MB, then at 8.4GB, and once again at 137GB. This barrier results from the original design specification for the ATA interface, which allotted a measly 28 bits for addressing a device. Because devices are "addressed" by their number of sectors, this 28-bit limit means that only a small number of sectors can ever be seen using a 28-bit number. The exact limit is 268,435,456 sectors of 512 bytes, which equals 137.4GB, to be exact. All newer drives now use 48-bit logical block addressing (LBA), which will allow hard dives to be addressed until they reach the ungodly capacity of 144 million gigabytes (144 petabytes), but that won't happen for at least a few years.

So, how to fix this? The easiest way is to install the latest Service Pack for your OS. Also, drives that run off a PCI ATA add-in card don't have to deal with this barrier because they are using PCI drivers from your motherboard's chipset. Most drive manufacturers also offer free utilities that will enable 48-bit LBA addressing as well.

DO EMULATORS DREAM OF COPYRIGHTED SHEEP?

I purchased *Doom 3* and *Call of Duty: United Offensive* from Activision. When I try to run these games, I get a notification that I have CD emulation software running. Inspection of the Device Hardware section of the Control Panel indicates none installed. I've had emulation software installed in the past, but not currently. Any idea what is left in my machine that's tripping the copy protection software into thinking I have that software installed?

—STEVE GRAFLUND

The Doctor appreciates your restraint, Steve. Usually, these letters read more like *"I PAID for this #$&@! game and the @$#&! won't @*$#! work. Damn them all to hell!"* and so on.

You didn't mention which CD emulator you had installed in the past. If it was *Daemon Tools*, try reinstalling and then uninstalling the application to remove any detritus that may have been left behind by a prior uninstallation. If this doesn't work, go to www.daemon-tools.cc, and on the home page, click Daemon Tools Help (to the left of the screen). Then click Uninstallation, and follow the instructions to manually remove the application.

If you've ever used Ahead's *Nero ImageDrive*, you'll have to completely uninstall the application and reinstall it again without activating *ImageDrive*. That's right—even if you've disabled *ImageDrive*, using it even once installs a driver that Activision's copy-protection doesn't like.

Activision's support page (www.activision.com) offers uninstallation advice for some programs.

In the Doc's opinion, this heavy-handed approach to copy-protection only punishes the consumers who actually buy the game, without even slowing down pirates. It's maddening that the legitimate software still refuses to operate *even when CD emulation is disabled*. Unfortunately, the only recourse is to vote with your wallet and return games to the store that purchased them if they won't install on your machine.

CAN DRIVER UPDATES INCREASE POWER CONSUMPTION?

Thanks for the great article on power supplies in your June 2004 issue. I was experiencing random lock-ups and had just about given up until I read that article; now I plan on upgrading to a better power supply. I did have one question, though: Is it possible to push an already overtaxed power supply over the edge by updating the drivers for a videocard? It may be a coincidence, but I started having issues with my system right after a driver upgrade for my GeForce4 Ti 4200. Could a driver update increase the need for wattage?

—KELLY MARTIN

Theoretically a driver update could increase the demand on your power supply, but we've never seen it happen. It's more likely your driver update didn't sit well with the other hardware in your system. We'd recommend updating the drivers for your motherboard chipset before you go out and buy a new power supply.

DELETING THE UNDELETABLE

I have a folder on my system that can not be deleted. Every time I try to delete it, this error message comes up: "Error deleting file or folder. Cannot delete folder: The directory name is invalid." I can rename

HARD OF HEARING

I jog regularly in Central Park and always take some music along to keep me going, but the volume levels are never loud enough. I've tried using both an MP3 player and my Samsung SPHi-700 phone. I have tried to enhance the audio levels of my WMA and MP3 files via *MP3Gain* but the audio becomes static or noisy. Is there a way for me to enhance the audio level of a song without distorting it?

—ALEX

In a word, no. MP3s, as you probably already know, are compressed by throwing out a certain amount of audio data in order to reduce the file size. You can use a program like *MP3Gain* to increase the volume a little bit, but you can't crank an already compressed file to Dr. Feelgood levels without some consequences.

There's no easy way to increase the volume of your MP3 files, but you can get a louder MP3 player. The iPod is one of the loudest players we've ever tested.

You have some options, though. You can rip your CDs over again and use an audio-editing application to increase the volume of each track (look in the Help file for "volume increase" or "gain" control) before compression. But that's a drag.

You can also buy better headphones. Sony's MDR-EX70LP and MDR-ED268LP series earbuds ($50, www.sel.sony.com) pump incredibly juicy bass from even weak-sounding, poorly compressed tracks, while remaining light enough to be comfortable for jogging. Even better, Shure's E3c earbuds ($100, www.shure.com) provide a better fit, blocking out more outside noise and thus reducing the amount of volume you need.

You also have the option of buying a louder MP3 player. The iPod gets brutally loud (fun fact: European iPods are quieter, for sensitive European ears). And if the iPod still isn't loud enough for you, crank it up with euPod, a third-party hack available for free at www.espen.se (keep in mind that there's an inverse relationship between volume and battery life).

Finally, you could go get a hearing exam at the free clinic.

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CHECK THE RATINGS ON EVERY VIDEO GAME BOX

ON FRONT

EARLY CHILDHOOD eC CONTENT RATED BY ESRB

EVERYONE E CONTENT RATED BY ESRB

TEEN T CONTENT RATED BY ESRB

MATURE 17+ M CONTENT RATED BY ESRB

ADULTS ONLY 18+ AO CONTENT RATED BY ESRB

ON BACK

EVERYONE E Comic Mischief Mild Lyrics

ESRB CONTENT RATING www.esrb.org

ESRB
Entertainment Software Rating Board
WWW.ESRB.ORG

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Ask the Doctor

the folder and cut and paste it to different locations but I can't open it or delete it. I think this folder used to contain digital pictures. However, Windows shows the folder to be empty and 0KB in size. How can I get rid of it?

—ROGER T. CHUNG

This problem is usually caused when a file folder has a character in the name that Windows doesn't understand. You can usually delete the file by using the command line. Open the command line by going to the Start menu, clicking Run, and typing cmd. Copy the folder to C:/temp/ using the graphical interface, then type cd \temp to browse to the temp folder. Type dir and look for the folder you're trying to delete. Make a note of the folder name. To get rid of it, type rd "folder name" (with quotation marks around the name of the folder).

ARE IE ALTERNATIVES MORE SECURE?

I recently read an article in *Maximum PC* about Avant and MyIE2 browsers and was left with a question: Do the two browsers, both of which are built on Internet Explorer, share the same security risks and vulnerabilities of Microsoft's browser? Or are Avant and MyIE2 more secure?

—PSICORPS

The reason we prefer Mozilla Firefox and Opera to the Avant and MyIE2 browsers is precisely because of Internet Explorer's inherent insecurity, which unfortunately affects the browser's offshoots. (Tabbed browsing and nifty extensions are just icing on the Firefox and Opera cakes.) With Firefox or Opera, you don't have to worry that you might render your system useless by accidentally installing a malicious ActiveX while innocently browsing the net. MyIE2 and Avant don't afford the same protection.

DO NOT ADJUST YOUR VERTICAL...

I'm writing to you about my NEC MultiSync FE991SB 19-inch CRT monitor, which I just purchased. Within the first 10 minutes of use, I noticed an odd-looking greenish hue in the upper left and lower left-hand corners of the monitor. Furthermore, there are two extremely fine lines running horizontally across my monitor. What could the problem be, and is there anything I can do to correct the problem? I would hate to have to ship the monitor back for a replacement.

—JON M. RYAN

Most likely, the discoloration you're noticing at the corners of your monitor is the result of magnetic interference – something CRTs are susceptible to. A buildup of magnetism either external or internal to the monitor can cause a CRT's electron beams to be deflected from hitting the appropriate phosphors, thereby causing discoloration, or sometimes a rainbow effect. Your first course of action is to run several degauss cycles on the monitor, waiting 20 minutes between each cycle. This option is usually available via the onboard controls. Also move any objects near the monitor that may include internal steel, iron, or magnetic material. Examples include speakers, small black power transformers, telephones, staplers, electric pencil sharpeners, etc. If the monitor rests on a steel desk or table, or if you have steel office furniture nearby, move the monitor to another location to see if that is a problem. Also try rotating the monitor by 180 degrees and degauss it as above. If the problem persists, try a manual degaussing coil, available on the Internet, which is capable of producing greater degrees of the alternating magnetism necessary to neutralize the offending magnetism.

The fine lines you're noticing across the width of the screen are characteristic of aperture-grille CRTs in particular. An aperture grille is a series of vertical wires running from top to bottom behind the screen, and through which the CRT's electron beam passes when creating the image you see onscreen. Any movement to these wires can cause the image to jiggle or become otherwise distorted. To keep the aperture grille taut and the image stable, very fine "dampening wires" span the grille horizontally at select points. Depending on the size of the monitor, there can be one, two, or three dampening wires present, and faintly visible.

THE HARD, AND SOFT, WAY

Hey, Doc, I just set up a network in my house and have a quick question: If I have a router that comes with a built-in firewall, do I also need to run a software firewall like *ZoneAlarm*? I want to make sure I'm fully protected.

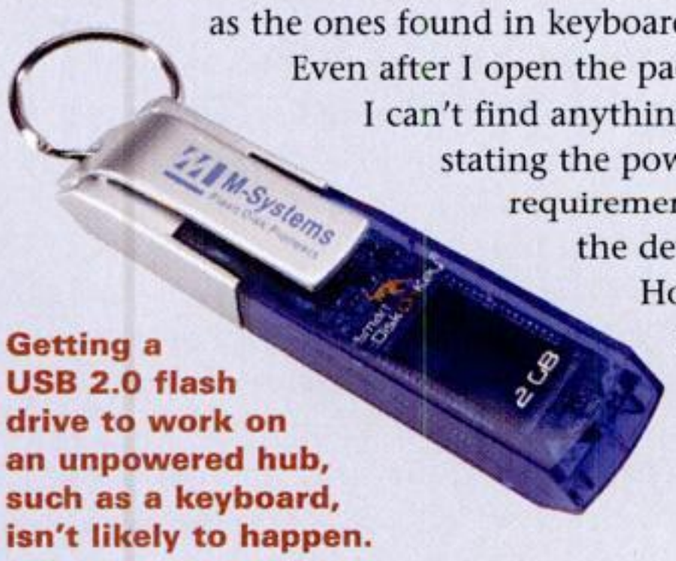
—RICK BROIDA

Strictly speaking, you don't need to run a software firewall if you have a hardware firewall in place. However, it's not a bad idea. In the event that a malicious worm gets past your firewall in the form of an e-mail attachment, a software firewall running on the PCs in your network will prevent the worm from spreading throughout your LAN.

Note: If any of the computers on your network are used away from the LAN, and therefore the router's built-in firewall, they should absolutely run a software firewall for protection. ■

POWER FOR THE LOW-POWERED!

I've been trying to determine which USB flash drives can be used in low-power USB ports such as the ones found in keyboards. Even after I open the package, I can't find anything stating the power requirements for the device. How do I find this out?



Getting a USB 2.0 flash drive to work on an unpowered hub, such as a keyboard, isn't likely to happen.

We'd also love to be able to stick our 2GB USB key into the port on our keyboard, but that just ain't gonna happen any time soon. The port **on your keyboard simply doesn't provide enough juice. According to M-Systems (maker of DiskOnKey and a huge player in the flash-based drive market), most USB 2.0 drives consume more than the 100mA of power that unpowered hubs typically provide. That means the devices are only guaranteed to work on powered hubs and ports connected directly to your motherboard.**

In fact, any USB 2.0, high-speed, bus-powered device needs a powered hub to operate. Low-speed USB 1.1 drives are considered low-power devices, and as such, will work just fine in unpowered hubs. In testing, we've had moderate success getting low-capacity USB drives (256MB and below) to work on unpowered hubs, though the results vary. In tests of every 1GB drive we have, only one was able to work in an unpowered hub.

Our advice: Stay away from lowly USB 1.1 devices, and either get a USB extension cable you can connect to the back of your PC, or get a USB 2.0 hub that you can plop down on your desk for quick access.

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Ten Things to Try If...

Windows Keeps Crashing

Straight-shooting fixes for Windows' most common fatal errors

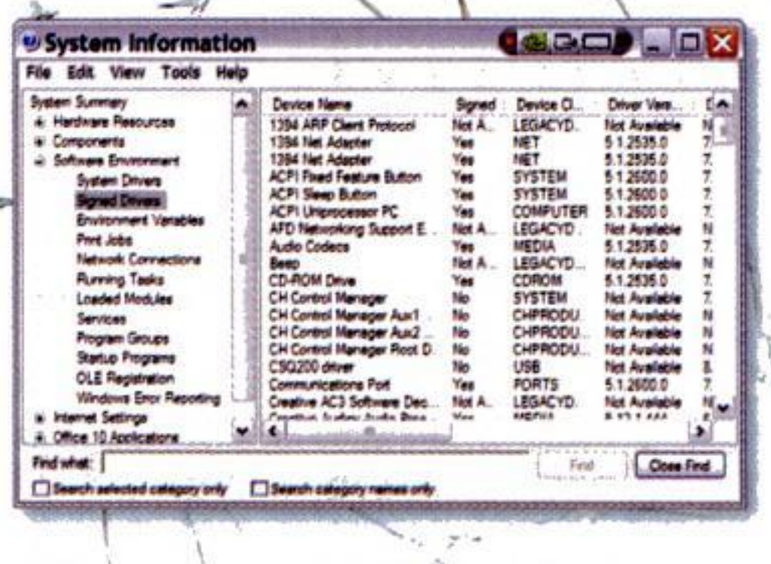
1. Flaky Memory: Many unexplained crashes can be traced to physical damage to memory. Microsoft has a diagnostic tool you can use to try to isolate the error—get it here: **http://oca.microsoft.com/en/windiag.asp**. Don't mix and match different types of DIMMs!

2. Blue Screen of Death: Though much more uncommon than with Win95, XP still experiences STOP, or fatal exception, errors that are displayed via a blue screen with white type. A STOP error is serious and can usually be traced to a hardware issue. Write down the eight-digit number in the error message and search for it on Google, which is usually fruitful. Microsoft's list of STOP errors can be found at **http://msdn.microsoft.com/library/en-us/w2kmsgs/6077.asp**. Here's another favorite: **http://aumha.org/win5/kbestop.htm.**

3. Clean Install: If WinXP is really driving you to drink, consider a complete reinstall, preferably including formatting the partition your OS was stored on. (For complete details on how to do this, see story on page 36.)

4. Repair the Registry: Other than RegEdit Export/Import, the only way to fix the registry is to use System Restore to roll your OS back to a day and time when it was working perfectly. Set a new restore point whenever you install a major new software program or piece of hardware!

5. Dinky Drivers: According to Bill, around 40 percent of Windows crashes are attributable to bad drivers—software drivers, not the bus variety. So try to install only drivers bearing Microsoft's "WHQL" stamp of certification. To see which of your drivers are WHQL-certified, go to Start>Programs>Accessories>System Tools>System Information. Then select the Software Environment>Signed Drivers branch.



6. Slowpoke: If your PC is experience random lockups or crashes, or is suddenly running slowly, listen for a repetitive "clicking" sound from your hard drive. This could signal a forthcoming drive failure. Back up your data, and think about a new drive.

7. Stop That: Have you overclocked your system? Come on, be honest. If so, and it's now failing, Big Bill may not be to blame. Set your BIOS back to its default settings and see if your problems "disappear."

8. Out, Out, Damn Spies! If you're witnessing generally wacky behavior on the part of your OS, spyware and/or Trojans are typically to blame. The easiest solution is to run a scanning program, such as **Ad-Aware** or **Spybot** (both are on the disc that came with this issue). These programs use a database of known naughty software code to search for and then remove or disable it with a single click.

9. Corruption: It's not just for politicians. To check for corrupt system files and try to fix them, select Start>Run, type SFC/SCANNOW and click OK. Windows will search for any protected files that may have become damaged.

10. ActiveX Baddies: Browser hijacking is another favorite way for spyware to hook into your PC, often resulting in system crashes. Check what ActiveX controls are running on your system with the free **Browser Helper Object Demon**, available at **www.definitivesolutions.com/bhodemon.htm.** You can disable ActiveX completely, which is the safest thing to do: Go to Start>Settings>Control Panel and select the Internet icon and then the Security tab. Select the Internet zone, make sure its setting is "Medium." Now, select the "Custom Level" option and click the Settings button. Check the Disable box for "Script ActiveX controls marked safe for scripting." ■

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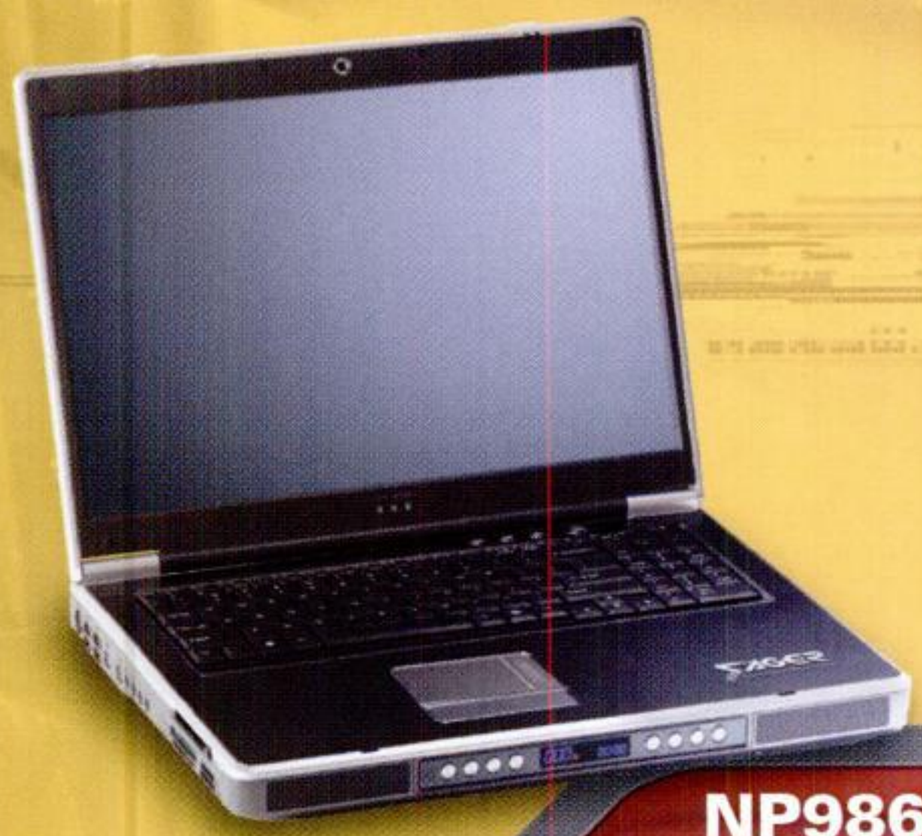

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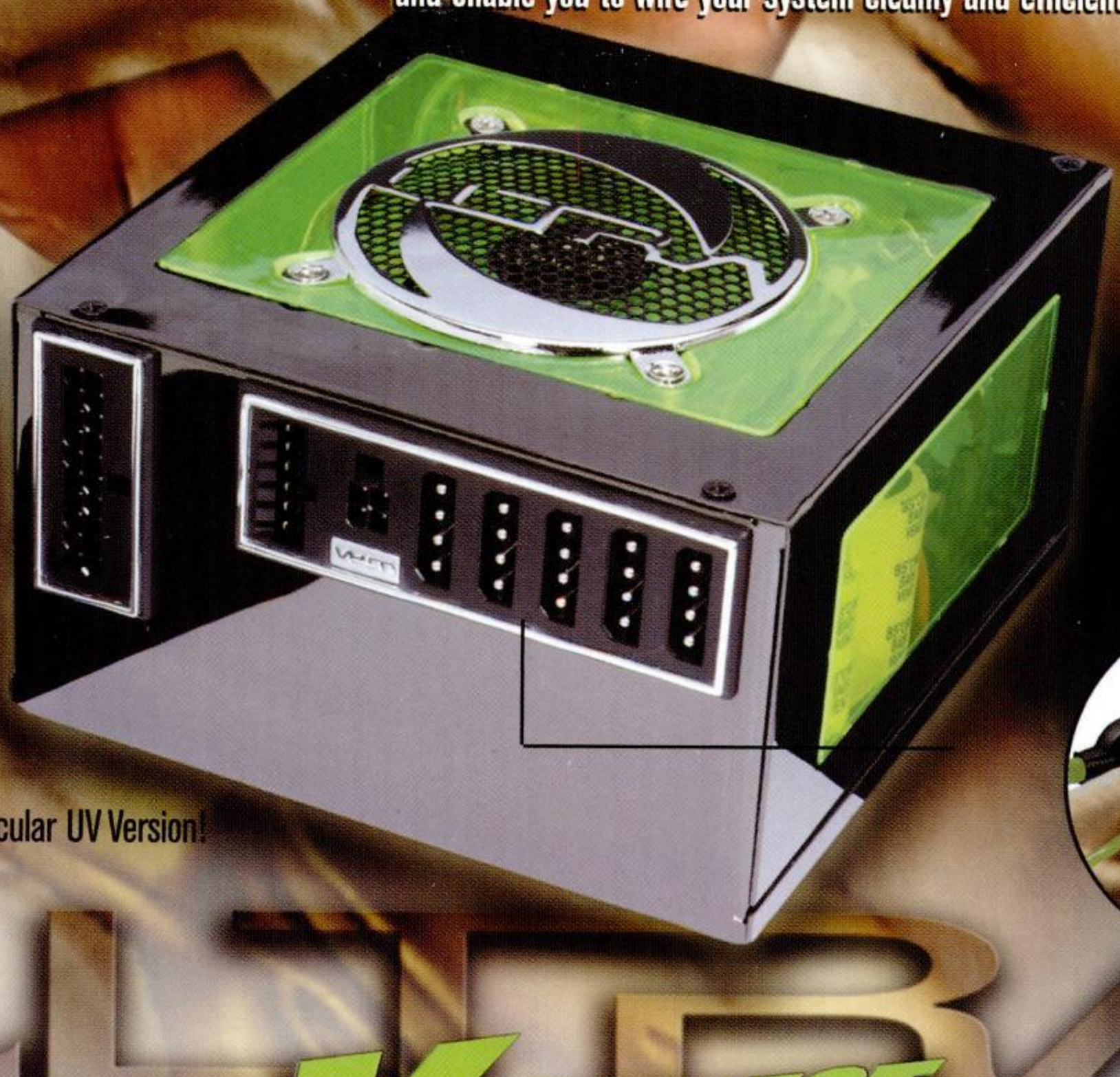

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